ISSN 0002-4805

The Alberta Journal of Educational Research

Volume XXI, No. 3 *September, 1975*

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The Alberta Journal of Educational Research *Vol. XXI, No. 3, September, 1975*

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A Logically *First* Stage in Training Creative Teachers?

One of the skills demanded of the creative elementary school teacher involves facility in conceiving apt and fruitful ideas for child activity. Using 60 female education students randomly assigned to four groups, three methods of improving this skill were compared with each other and with a control. Training schedules were as follows: Group D—no training; Group C—individuals preparing lists of activity ideas on set themes; Group B—as for C, but with the aid of standard written suggestions; Group A—as for B, but with group discussion.

Each experimental group spent the same amount of time in training and prepared lists of ideas over a period of five weeks on 20 themes. Two final lists of ideas prepared by all Ss were then rated by independent judges according to pre-established criteria. The predicted superiority of training over non-training groups was confirmed, but the superiority of the discussion group over both other training groups was not confirmed. Other evidence, however, provides grounds for preferring the method followed in the discussion group. It is suggested that the precepts of the "Methods" lecture need to be supplemented by this more basic form of skill learning. (Howard Poole is Assistant Professor in the Department of Education at Dalhousie University.)

The Problem

A process can only truly be described as educational when it goes beyond the training of semi-mechanical competences and seeks to develop understanding. Contemporary theory and school experience favour the view that at the elementary stage of education, in particular, learning is most likely to produce understanding when children enjoy some degree of choice in regard to what and how they shall learn. Neglect of this principle was responsible for the sheer inefficiency—as well as the drudgery—of traditional education. Children for the most part achieve insight in the course of their own purposeful activity, suitably guided. On this view, the teacher's main function is that of providing a framework within which these active experiences can occur, and yet assume significance and

coherence within the general curriculum. One aspect of this task is provision by the teacher of a choice of active experiences that are both appealing and relevant.

Many educators will agree that too few teachers possess the abilities required to meet this kind of educational challenge. One of the most commonly encountered excuses for dull classroom climates is that the teacher "couldn't think of anything (stimulating and worthwhile) for the children to do for themselves." Can anything be done to remedy this state of affairs? Can the teacher be helped to acquire a more imaginative appreciation of the possibilities in a learning situation? The study reported below attempts an experimental assessment of three methods of attacking this problem. These methods are adaptations of training paradigms which have long been employed in teacher education programs.

The Conceptual Framework

The ability to provide fruitful and absorbing experiences in the form of pupil activities is complex: it involves both planning and executive phases, each of which would appear to incorporate an extensive range of sub-skills. The present study will confine its attention to a single aspect of this overall planning operation. This aspect is, as the title of the report suggests, the logically basic ingredient of this enormously complex skill; namely, the ability to produce *ideas* for activities—Activity Idea Production Ability (AIPA). All teachers can be presumed to possess this ability in some degree; the problem to be investigated in this study is whether AIPA can be improved by training. The term "activity" is used here to refer to relatively transient processes in the various modes of constructing, discussing, observing, illustrating, composing and so forth which a teacher may encourage children to engage in singly or in groups as a means to promoting specifiable learning goals. The skilful exercise of AIPA will consist in producing ideas for pupil activities in suitable detail and with due regard to prevailing circumstances; in other words, although these ideas will tend to embody familiar schemas, it is only by combining and modifying them to suit particular individuals, groups, or occasions that they can be made relevant. It follows that any attempt to improve AIPA will consist not merely in instilling a repertoire of Activity Ideas, but rather in promoting an ability to modify existing repertoires creatively. Whereas repertoires can be learned by reading books about teaching, it seems doubtful in the light of teacher training practice hitherto whether AIPA can be substantially improved by this means alone.

The Present Study

The aim of the experiment described in this report was to demonstrate that ability in generating activity ideas (AIPA) can be improved by training and to determine which of the more obvious training options would result in greatest improvement. The basic training employed a variant of Maltzman's technique (1958) for producing originality in word associations. *Ss* were required to produce continually different activity variations on themes provided by unit topics. Although the prescribed topics were similar in general character, *Ss* were instructed to avoid, as far as possible, repetition of activity ideas within and between topics.

In order to determine which treatment most improved the quality of activity idea production—which was to be judged in terms of relevance, feasibility, educational value, originality, and comprehensiveness—three experimental groups preparing unit activity lists under different conditions of enrichment were compared on terminal tasks with each other and with a control group. Enrichment was defined in terms of the volume of theme-relevant ideas available to the learner during training and/or the opportunity to discuss these ideas.

Differential enrichment was arranged as follows. In the first (non-enrichment) group, *Ss* were required to prepare individual unit activity lists on specified topics without faculty or other guidance and without discussion. Members of the second (reading enrichment) group were asked to prepare lists on the same topics, but received at the commencement of each session mimeographed model activity lists on the prescribed topic. Finally, *Ss* in a third (discussion enrichment) group, although allotted the same tasks as the other two groups and provided with models, generated their lists by small-group discussion.

On the basis of general principles of learning and the claims made by Osborne (1957) and other writers regarding the superior productivity of groups over individuals, the following hypotheses were formulated:

1. That groups practising AIPA would achieve significantly higher scores on a terminal test requiring AIPA than would be achieved by a control group.
2. That, of the groups engaged in training, those provided with enrichment would show significant terminal superiority in AIPA over the non-enrichment group.
3. That the enrichment group which combined training with small-group discussion would score significantly higher than the other enrichment group.
4. That enjoyment of training would be significantly greater in the discussion enrichment group than in the other groups.
5. That the AIPA developed in training on one sort of curriculum material would show evidence of transfer to another partially related subject matter.

The prediction contained in Hypothesis 3 was made despite the evidence (summarized by Kelley & Thibaut, 1969; Bouchard & Hare, 1970) that groups inhibit rather than promote productivity. The investigator believed that the special characteristics of the discussion group situations in this experiment would overcome the usually cited constraints placed upon group members.

Method

Subjects

Ss were 60 female Canadian elementary education students almost entirely of Nova Scotian birth and upbringing, randomly assigned in equal numbers to a control and three experimental groups. So as to avoid as far as possible the so-called Hawthorne Effect, the control group participated as *Ss* in another unrelated training program running concurrently and demanding exactly the same time commitment. Outside these ex-

perimental treatments, all *Ss* pursued exactly similar courses of instruction which unavoidably involved some unit plan preparations, and they had all previously undergone four weeks of practice teaching. *Ss* were told that the aim of the training sessions was to improve their lesson planning ability but were not apprised of the experimental nature of their involvement.

Procedures

Training for the three experimental groups consisted in the preparation of 20 standard Social Studies Unit Activity Lists. The emphasis to be given each unit topic was fairly exactly specified. *Ss* were required to list activities relevant to each topic and were continually reminded to avoid repetition of previous ideas, unless a previous idea was especially appropriate to a topic; in other words, *Ss* were required to justify to themselves the inclusion of previously conceived material. They were moreover instructed to concentrate on the quality and quantity of activities rather than attempt to produce coherent unit plans. Precise conventions were established for the preparation and layout of lists, and for selection of activities.[1] The topics were taken in equal numbers from the grade three and grade five Social Studies syllabuses for the Province of Nova Scotia and were administered alternately. Two lists each of 30 minutes duration were prepared during each session of one hour, with each group undergoing two sessions per week for five weeks.

The three experimental treatments were as follows:

1. Group C (non-enrichment group): individual written preparation of unit activity lists during training sessions.

2. Group B (reading enrichment group): as for 1, but *Ss* were provided with mimeographed models for each list they prepared. These models consisted of (a) lists of activities relevant to the topic prepared beforehand by persons not involved as subjects in the experiment and (b) the lists prepared by the discussion enrichment subgroups on the same topic.

3. Group A (discussion group): lists were prepared by three constituent groups of five persons each randomly assigned and constant in membership throughout the experiment. Each group was provided with models as mentioned in 2(a) above. *Ss* in each group took turns in acting as recorder. Mature students uninvolved as *Ss* in the experiment acted as timekeepers and distributors of materials. Otherwise they detached themselves from the proceedings and offered no comments or evaluation.

In order to control as far as possible the effects due to discussion, interpersonal communication and exchange of ideas was permitted only in Group A, though no communication between subgroups of A was permitted. Furthermore, all materials and lists used during training sessions were confined to the training rooms. Lists were kept, as they were written, in individual files to which the students had free access only during training sessions. It was not possible, of course, to control out-of-session discussion among *Ss* or reading by those who might have been motivated to improve their performance in training sessions.

Evaluation

Quality of Activity Idea Production

1. The terminal tasks. During the week following the termination of training all experimental and control *S*s were required to prepare, individually and without assistance of any kind, lists of activities relevant to two topics. The first of these was a grade four social studies topic, the second, a science topic for the same grade. No special scientific knowledge was required for this latter topic; it was employed as a terminal test in order to ascertain whether the anticipated improvement in AIPA would transfer to a different though related subject area. Forty minutes was permitted for the preparation of each list. *S*s were asked to provide capsule descriptions of ten different activities relevant to the prescribed topic. All *S*s made the required ten entries on both tests. Previously established conventions for plan preparation were observed. No indication had previously been given of terminal evaluation.

The resulting 1,200 activity ideas (60 *S*s x 2 topics x 10 activity ideas) were corrected for grammatical and spelling errors, typed onto cards, coded for subject and treatment and then presented to three independent raters who were specialists in elementary education and strong advocates of activity methods. The social studies and science decks were evaluated separately.

2. Rating procedure and criteria. Raters were thoroughly briefed as to what was expected of them and "dry runs" indicated an initial high concordance in their ratings. The criterial attributes of "goodness" in an activity idea were:

a. First and foremost, that it should show evidence of originality, in the sense of capitalizing upon the less obvious possibilities for pupil/group/class activity;
b. In addition to the above, it must also be (1) relevant to the specified unit topic, (2) valuable as a learning experience for children at the intended level, (3) feasible in terms of human and material resources. The resources that *S*s could take for granted in this respect were defined in "Mimeographed Instructions" (see previous footnote); accordingly they were able to assume an unusually richly provided and sympathetic school and community environment, and (4) comprehensive rather than merely a fragment of an idea; that the idea should have been developed, though in a manner not necessarily related to the length of the capsule description. In fact, a large proportion of the ideas consisted of a single short sentence.

The above criteria clearly overlap and raters therefore could only be asked to bear them in mind. For each of the two terminal decks, raters were asked to place cards bearing the activity ideas into piles according to an A to E rating (A: outstandingly original and in general keeping with the other criteria; C: not original but serviceable and in general keeping . . .; E: possessing no merit; with B and D occupying mid-positions on the scale.) Raters were warned about response sets and about the desirability of achieving something approaching a normal distribution. Although the A and E ratings were rarely used, evenness was sufficiently achieved in the other categories to permit the subsequent analysis. After the first sort, raters were asked to go through the piles again, making adjustments across rating grades. Then they were asked to go through the piles a third time for final corrections.

The aggregate score (possible 40, A=4, E=0) awarded by each rater to each activity list (ressuscitated by drawing together ten component scores) was computed and combined with the other two ratings (interpreted as scores) for the same list. A final score for each subject (out of 120) was thus arrived at for each of two terminal tests.

Results

The validity of conclusions drawn in this report depends heavily upon there being an acceptable degree of concordance between raters. Tables 1A and 1B provide a measure of reliability of raters on both terminal tasks in terms of intraclass correlation.

TABLE 1A
RELIABILITY OF RATERS BY INTRACLASS CORRELATION—
SOCIAL STUDIES LISTS

Source of Variation	SS	df	MS	F	
Persons	3940	59	66.7	7.7	$p < .001$
Raters	8	2	4.0	1	N.S.
Remainder	969	118	8.2		
Total	4917	179			

Reliability for a single rater: 70.
Reliability of mean of 3 ratings for each person: 87.

TABLE 1B
RELIABILITY OF RATERS BY INTRACLASS CORRELATION
SCIENCE LISTS

Source of Variation	SS	df	MS	F	
Persons	4395	59	74.5	8.09	$p < .001$
Raters	14	2	7.00	1	N.S.
Remainder	1088	118	9.2		
Total	5497	179			

Reliability for a single rater: 70.
Reliability of mean of 3 ratings for each person: 88.

The absence of significant difference between raters in spite of the highly significant differences between *S*s, provides justification for summing the ratings (interpreted as scores—the rationale for using parametric tests on these data is argued by Anderson, 1961) awarded by each rater to each *S* in order to yield the data in Table 2. The control group is designated D.

TABLE 2
MEAN SCORES ON TWO TERMINAL TESTS BASED ON SUMMED RATINGS FOR EACH ITEM (POSSIBLE 120)

Group/Treatment	(1) Social Studies Mean	SD	(2) Science Mean	SD
A	80.1	14.45	75.8	13.2
B	74.4	12.7	72.7	12.4
C	68.7	10.6	67.0	10.5
D	65.6	12.8	64.6	11.1

This array of data permits the test of Hypothesis 5 (the transfer hypothesis). The science activities task required *Ss* to exercise AIPA in a subject area different from that involved in training. It is assumed that some adaptation of previous learning was thereby demanded, although logical similarities between the structure of science and social studies at the grade level in question ensure that many activity ideas are mutually applicable.

The hypothesis is tested in the following manner. If transfer occurs as predicted, the *rank order* of mean scores on the second (science) task will resemble the rank order of the same groups on the first task. A perfect correspondence in rank order proves to be the case. But the probability of correctly predicting this permutation is 1/4! Accordingly, the transfer hypothesis is confirmed beyond the 95% confidence limit ($p < 0.042$). Whether this effect would carry over to areas of widely differing epistemic structure (e.g., mathematics) is of course unsure on this evidence, though some *Ss* have reported such overall improvement in AIPA as a result of training.

Next, the data from which Table 2 was compiled are tested below for significant differences between groups.

TABLE 3
EFFECTS OF PRACTICE
SUMMARY OF ANALYSIS OF VARIANCE OF SCORES ON TWO TERMINAL TESTS

Source of Variation	(1) Social Studies SS	df	MS	F	(2) Science SS	df	MS	F
Between Groups	1841	3	613	3.5**	1183	3	394.3	2.6*
Within Groups	9819	56	715.3		8487	56	151.5	
Total	11659				9670			

** $p < .025$
* $p < .10$

A significant result in 3(1) justifies a preplanned comparison of treatments.

TABLE 4
COMPARISON OF TREATMENT EFFECTS UPON SOCIAL STUDIES SCORES: PARTITIONING OF SS_{bg} FROM TABLE 3(1)

Source of Variation	SS	df	MS	F	*p*
Between Control & Treatment Groups (D vs. A, B, and C)	866	1	866	4.93	< .05
Between Enrichment & Non-Enrichment (C vs. A and B)	735	1	735	4.19	< .05
Between Kinds of Enrichment (A vs. B)	240	1	240	1.37	N.S.

Hypothesis 1 (effect of practice) and Hypothesis 2 (effect of enriched practice) are both confirmed, but the test of Hypothesis 3 (superiority of discussion over reading enrichment) does not achieve significance.

The prediction of greater enjoyment by the discussion treatment (Hypothesis 4) is tested by organizing the confidential evaluations of training made by *Ss* in Table 5. The evaluations took place immediately after the terminal tests.

TABLE 5
ENJOYMENT OF TRAINING BY TREATMENT GROUP[1]

Group	Response Choices			
	High Enjoyment	Low Enjoyment		
	Very Much	Moderately	Very Little	Not at All
Discussion				
A	7	3	3	2
Non-Discussion				
B	0	6	6	3
C	1	4	5	5

[1]Frequency of qualification chosen to complete statement beginning "I enjoyed the training sessions..."

The hypothesis is tested by pooling the frequencies in the non-discussion and low-enjoyment categories to produce a 2 x 2 table of which $\chi^2 = 14.6$ with 1 d.f.: $p < 0.001$ (one-tailed test).

Finally, the data presented in Table 6 are relevant to establishing the claim that *originality,* as well as recollected activity ideas, has contributed to the scores of treatment groups. Resolution of this point is crucial to the basic position taken in this report—that the higher scores of experimental *Ss* is evidence of a more original approach to unit planning. The problem arises in this way. Activity ideas may be original productions or they may be items recollected from previous experience or training sessions. Clearly there can be no certain way of deciding to which category a particular idea belongs. In this sort of situation it is tempting to apply Occam's razor—that is to say, if the terminal performances are sufficiently explained by recollection of previously en-

countered ideas, it is both unnecessary and illegitimate to postulate that *originality* as well as *repertoire* has been learned.

The problem is aggravated by the difficulty of providing an external criterion for the existence of the originality component in AIPA. This would entail showing that the training described in this report would significantly affect scores in tests of originality or creativity which were general in character. With this aim in view the present author, having previously trained 20 *Ss* on Treatment A—though with much more involvement in the proceedings on his part—and having discovered significant differences in quality of activity idea production between this group and a control, administered the Torrance Tests of Creative Thinking to both groups. No significant difference between groups on the TTCT was evident. The investigator concluded that no simple identification of AIPA with creativity was warranted.

It was decided therefore to use a weaker, internal criterion of the predicted increase in originality. Improved originality would be assessed relative to the body of responses actually generated by the four groups on the terminal tests. This procedure certainly restricts the extent to which the results of this study can be generalized, but it seemed the only available strategy in the circumstances. Accordingly, the frequency of A ratings awarded by the raters on each test were extracted from the data and summed to produce Table 6. These "outstandingly original" ratings were few in number—less than two percent of the total number of ratings—which, for reasons mentioned by Guilford (1954, p. 297) in connection with ratings of humour, is hardly surprising. After three sortings, initial judgments of originality tend to be revised downwards.

TABLE 6
ORIGINALITY IN ACTIVITY IDEA PRODUCTION[1]

	Group			
	A	B	C	D
Summed Frequency of 'A' Ratings on Two Terminal Tests	26	19	11	13

$\chi^2 = 7.935$ with 3 df $p < .05$ (One-tailed test)

[1]Goodness of fit of frequency of 'A' ratings by group to a rectangular distribution.

If originality had not been learned during training, the A ratings should have been evenly distributed among the four groups. Table 6 shows that this is not the case. Despite a slight variation in the readiness of raters to award A's, the results are indicative of a significant trend in the predicted direction.

Discussion

Of the five hypotheses tested, four have been confirmed at high or acceptable levels of confidence. Comment will be restricted to the failure to confirm Hypothesis 3. The superiority of discussion over reading enrichment although in the predicted direction, was not borne out at the predetermined .05 level of significance. The author is strongly inclined to attribute this failure to the very attempt to control conditions in Treatment A which was a prerequisite for valid subsequent comparison of experimental treatments. On the basis of his per-

sonal experience with groups, the author had believed that the advantages of groups over individuals, as detailed by Maier (1967), would be maximized when groups consisting of teachers, or intending teachers previously exposed to classroom situations, were confronted with the task of co-operatively planning classroom tactics. It had always been the author's impression that elementary school teachers were unusually ready, as compared with other occupational groups, to instruct others, including associates, on matters pertaining to teaching. Furthermore, it was thought that groups would be more apt than individuals to avoid repetition of previous ideas and thus provide a greater challenge to innovation.

However, the level of interaction in the three subgroups of Treatment A departed considerably from expectations. One group was extremely productive, another enjoyed spasmodic periods of inspiration, while the remaining group performed rather sluggishly throughout. The consequent variation in the training environment for members of the subgroups accounts for the relatively large variance in A group scores on the social studies test (Table 2) and is consistent with the interpretation invited by Table 5 that the benefit derived by different individuals from Treatment A varied greatly.

In summary, the following explanation is offered for the failure of Treatment A to achieve its objectives relative to Treatment B: that the level of maturity and professional preparation of the *S*s involved in the discussion group was insufficient to enable them to function as autonomous groups; that many *S*s at this stage of teacher development require motivation and leadership from outside the group. Unfortunately, this latter sort of influence upon the dynamics of a group does not easily lend itself to the sort of analysis attempted in this study. The confirmation of Hypothesis 4 (that discussion will be the most enjoyed treatment—Table 5) does, however, provide a reason of a different kind for preferring discussion to the mere assignment of reading material in training AIPA.

Applications and Conclusion

The success of the child-centred movement in education depends upon higher levels of instructional skill than have previously been demanded of teachers. One important ingredient of this skill is AIPA. Being able to conceive clever, original ideas for pupil activity is a necessary—though not a sufficient—condition for successfully managing learning in a modern elementary school. Yet there are still many educational systems and cultural settings which, in one way or another, discourage teachers from developing or exercising AIPA. The consequence of this deficiency must be a less varied learning environment for children.

AIPA training is the beginning of an answer to this problem. It is an attempt to create a partial bridge between the somewhat abstract counsels of the Methods Lecture, on the one hand, and Teaching Practice on the other. Because AIPA training involves the intending teacher in *activity,* it is assumed to produce learning at a more fundamental level than would be expected from the digestion of verbal precepts alone. The present study has shown that AIPA can be improved by practice, especially by practice under enriched conditions. Although the relative merit of the two enrichment conditions has not been conclusively determined, the greater enjoyability of the discussion

method (Table 5) recommends its use over that of a regime based solely upon printed matter.

The most promising application of these findings would seem to be in the incorporation of small group techniques within the more traditional patterns of Methods courses rather than by employing the actual schedules of group discussion described in this report. In conclusion, the present writer believes that further isolation and study of the trainability of component skills of teaching could contribute towards the improvement of teacher education programs.

The author acknowledges his gratitude to Dalhousie University for the facilities and grants which made this study possible.

[1] Mimeographed "Detailed Instructions for List Preparation" are obtainable from the author. The most important effect of these instructions was to control the complexity of the context in which AIPA was exercised. This was achieved by making as many features as possible of the hypothetical school situation (age, ability of children, school characteristics, etc.) explicit and standard for all *Ss*.

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The Alberta Journal of Educational Research *Vol. XXI, No. 3, September, 1975*

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The Development of Word Meaning Discrimination in Children

In the past, investigations have been made into the development of word definition abilities in children. Such studies focused on the child's ability to formulate formal definitions. In the present study, the development of the ability to differentiate among various kinds of word meaning was explored. The results indicated that children in the eighth and eleventh grades (about 13 to 16 years of age) are capable of discriminating among various kinds of word meaning. The consequences of the research for the development of achievement tests is discussed. (Dr. Maguire is Professor of Educational Psychology at The University of Alberta; Mr. Patsula is a teacher with the Edmonton Separate Schools; Dr. Evanechko is Associate Professor in the Faculty of Education, the University of Victoria.)

Several researchers have investigated the development of word definition abilities in children (Wolman & Barker, 1965; Al-Issa, 1969; Swartz & Hall, 1972). Their results are consistent in indicating that as children grow older, their choice of definitions pass through three general stages: descriptive (an apple is red), functional (an apple is good to eat), and categorical or abstract (an apple is a fruit). While these findings are interesting relative to the development of formal operations in children, they do not cast much light on the broader question of the development of a differentiated concept of word meaning. In short, previous research has been concerned with the question, "When do children begin to develop formal definitions?"; the broader question is, "When do children begin to realize that there are different kinds of meaning?"

Despite its age, the mediational view of meaning outlined by Osgood, Suci, and Tannenbaun (1957) provides a useful model of meaning with the idea that a word derives its meaning by being embedded in an individual's semantic space. Semantic space is a term used to describe the network of relationships

which link internal mediating responses. The position of a word in the semantic space in effect describes its meaning. In their studies of the connotative meaning of words, Osgood and his associates produce a dimensional analysis of connotative links that exist in the semantic space. There are many other kinds of links that exist, however, and in the present study, attention was directed toward the emergence of these links in children.

Evanechko and Maguire (1972) suggested that the semantic space is comprised of 24 kinds of logico-semantic relations which in effect are ways in which words possess meaning. They attempted to resolve the 24 kinds of meaning into a smaller set of dimensions to see if the resulting configurations, when derived for children at two age levels, indicated a developmental trend. They suggested that differences between children in grades 5 and 8 existed in the semantic structures, with younger children having spaces oriented toward experience, and older children showing more sophisticated class structures. These results were in agreement with the earlier research on word definitions, but again, no attempt was made to address the broader question of whether the older children possessed more differentiated semantic structures.

According to the mediational view, as the child grows older and gains more experience with his verbal environment, there should be a concomitant increase in the number of ways in which he can attach meaning to words. The purpose of the present study was to investigate this development by examining the ability to discriminate among kinds of word meaning in children at three age levels.

The logico-semantic relations used by Evanechko and Maguire (1972) were derived by Evanechko (1970) from the literature on the development of children's word definitions (Annett, 1959; Burns, 1960; Cronbach, 1943; Dale, Eicholz, & Bennet, 1960; Fiefel & Lorge, 1950; Flavell & Flavell, 1959; Lewinski, 1948; Petty, Herold, & Stoll, 1968; Russell, 1954; Vinacke, 1951; Welch, 1940). The 24 links, together with an example of each, are shown in Table 1. They should be taken as neither strictly mutually exclusive nor exhaustive.

In the present study, the children were asked to sort several examples of different meaning types into categories, and then to explain the strategy that was used for any one of the categories. The work of Vygotsky (1962) and Bruner (1964) provided the framework for interpreting the sorting strategies.

Vygotsky (1962) takes the position that three phases are passed through in the ascent to concept formation.

1. Objects are placed together in heaps for purely subjective reasons.

2. Objects are placed together according to objective bonds that exist between them, but these bonds lack a logical unity so that there may be many different rules for including the different objects in a single group. The objects may even be placed together by connecting them with a story or theme. The groups at this stage are called complexes.

3. Objects are placed into groups according to a single rule.

Bruner and Oliver (1963) and Bruner (1964) noted a similar developmental trend in that younger children rely most heavily on perceptual attributes of objects to form complexes, but as they grow older they begin to focus on functional properties to form superordinate groupings, or true concepts. Both the Bruner and Vygotsky views are consistent with the research on the development of word definition abilities cited earlier. In the present study, an

attempt was made to classify the sorting strategies of the subjects in accordance with the developmental sequence outlined above.

Method

The Task

A pilot study was carried out using three decks of 48 cards, each card illustrating one relationship (e.g. rob-steal). Each deck contained two examples from each of Evanechko's 24 categories. The subjects were asked to verbalize their grouping strategies. From the results, it was found that the task was too unwieldy, particularly for younger subjects. The subjects required a huge physical area to do the task; they could not keep track of their reasons for sorting; and with only two examples for each category they found it difficult to obtain satisfactory closure on their categories.

It was decided to alleviate the problem by increasing the number of examples available from each theoretical category, and decreasing the number of categories represented within the set that a particular individual had to sort. Ultimately it was decided to break the 24 categories into five sets (one set of four categories and the rest having five categories). The disadvantage of this technique is that it is impossible to see if the children can discriminate among all of the categories at the same time. Because of this, it was decided to try to place the categories into sets in such a way that categories which might easily be confused with each other should appear in the same set, and that categories with obvious differences should be separated. In other words, steps had to be taken to maximize the opportunities of rejecting the hypothesized structure.

Since Evanechko (1970) had suggested five logical sets of the categories, this provided a useful starting point. Pilot studies revealed that in simplifying the sorting task most individuals divided the examples into two piles, one containing categories with single word definers, and the other containing categories of multiple word definers. Since the subjects did this anyway, care was taken to place single word and multiple word definers in different sets. Also, in the Evanechko and Maguire study as well as in the pilot work it was found that subjects confused Superordinate and Generic meanings, Coordinate, Part-Part and Free Association meanings, Attribute and Action-of meanings, and Repetition and Denotation in Context meanings. In grouping the categories, often confused categories were placed in the same set. The resulting sets are shown in Table 1.

TABLE 1
TWENTY-FOUR CATEGORIES OF LOGICO-SEMANTIC RELATIONS EXHIBITED IN DEFINITIONS USED BY CHILDREN

Set	*Category*
A	1. *Synonym.* The members of each word pair have exactly or very nearly the same referent: e.g. steal—rob
A	2. *Similarity.* The members of each word pair are similar through being aligned on some dimension, with the referent of the right-hand member occupying a more extreme position of this dimension: e.g. hungry—starving

A 3. *Superordinate.* The left-hand member denotes a common class of which the right-hand concept is a member:

e.g. fruit—apple

A 4. *Whole-part.* The right-hand member of each pair refers to a familiar object recognized as an important part of a familiar whole denoted by the left-hand member:

e.g. bird—wing

A 5. *Generic Definitions.* The right-hand member denotes the common class to which the left-hand member belongs:

e.g. cup—dinnerware

B 6. *Coordinate.* The members of each pair refer to familiar members of a familiar class:

e.g. chair—table

B 7. *Contrast.* The members of each word pair refer to opposite ends of a continuum:

e.g. hard—easy

B 8. *Part-part.* The members of each pair refer to familiar objects which are parts of a familiar whole:

e.g. wall—floor

B 9. *Free Association.* The members of the unit are free associates:

e.g. carry—heavy

B 10. *Connotation.* The right-hand member of each pair connotes a relationship with the left-hand member:

e.g. royal—strong

C 11. *Attribute.* The right-hand member of each pair refers to a quality or attribute generally recognized as characterizing the object denoted by the left-hand member:

e.g. turtle—slow

C 12. *Action-of.* The right-hand member of each pair is an intransitive verb denoting concrete action associated with and performed by the agent referred to by the left-hand member:

e.g. baby—cry

C 13. *Action-upon.* The left-hand member of each pair is a transitive verb denoting a concrete action associated with and performed upon the object referred to by the right-hand member:

e.g. sweep—floor

C 14. *Common Use.* The right-hand member of each pair denotes an object associated with and acted upon by the agent referred to by the left-hand member:

e.g. farmer—tractor

D 15. *Use Of.* The right-hand member of each unit denotes a use made of the left-hand member:

e.g. envelope—for putting letters in

D 16. *Contiguity.* The left-hand member of the unit is defined by direct concrete interaction of place, time or activity with the right-hand member.

e.g. late—you can see by the clock

D 17. *Analysis.* The right-hand member is an analysis of the left-hand member indicating certain dimensions of function of this concept:

e.g. lengthen—make a thing longer

D 18. *Synthesis.* The right-hand member defines the left-hand member by stating its relation with other concepts commonly associated with it:

e.g. bunk—it has two levels

D 19. *Ostensive Definition.* The right-hand member defines the left-hand member largely on the basis of experience:

e.g. selfish—all for yourself

E 20. *Repetition.* The right-hand member of each unit is a repetition of the concept referred to by the left-hand member:

e.g. drink—a drink of water

E 21. *Extension of a Class (Implication).* The right-hand member of the unit gives examples of concepts to which the left-hand member might refer implying a degree of familiarity with the concept:

e.g. farming—crops and animals

E 22. *Denotation in Context.* The left-hand member is defined by use in context:

e.g. sharpen—sharpen the knife till it cuts well

E 23. *Class Membership Implied.* The right-hand phrase attempts to bridge the gap between general and specific by using phrases such as "a kind of", "sort of" or "like a":

e.g. stool—like a chair

E 24. *Intension of a Class (Genus et Differentia).* The right-hand member states the class as well as the distinguishing features of the left-hand member:

e.g. sipped—drank a little at a time

For each category in each set, six examples were selected from Evanechko's pool, so that each set of categories consisted of 30 examples (except for C which had 24). The definitions were printed on two inch by four inch cards and randomly arranged in decks corresponding to the five sets.

Subjects

The task was administered to 176 subjects in grade 5, 196 subjects in grade 8, and 198 subjects in grade 11. An approximately equal number of subjects sorted each set of items at each grade level. Each subject was given a copy of the introduction, an answer sheet, and one of the five sets of cards. Care was taken to insure that neighbouring students received different decks of cards. In each set, the cards were arranged in random order.

Procedure

An introduction was given consisting of two parts. In the first part, classification principles were illustrated using geometric figures of different sizes. The students were shown that there are many ways of grouping the figures and that any way is correct provided that there is some reason for putting an object in a group. In the second part of the introduction, a set of nine definitions not used in the study was grouped for the students in two different ways. Care was taken to indicate that the illustrated groupings were not the only ways that the definitions could be grouped. Although there was some concern that the example sorts might influence the grouping strategies of the subjects, it was decided that if the Vygotsky and Bruner positions had much validity, the strategies employed by the subjects would not be greatly influenced by the two examples. In short, the subjects would hear what they were capable of hearing. The advantage of the two examples was to show the students the form of the response required, and to illustrate that there was more than one way to do the task. The students were told that they could use as many categories as they wanted to, and that they could put as many cards in each category as they wanted to, but that all cards in a set should have similar definitions.

Method of Analysis

The data were analyzed for each grade by set combination by the latent partition analysis (LPA) procedure outlined by Wiley (1967). In general, LPA is used in situations in which subjects partition a set of items into a number of

categories, where there are no restrictions on the number of partitions, nor on the number of items placed in each of the categories. The LPA model assumes that when a relatively homogeneous group of people sorts a set of objects, there exists a latent partitioning of the objects which underlies each individual's manifest partition. In the hypothetical case different manifest partitions arise from the combination of various latent categories, or from the fractionation of latent categories. The basic model is

$$S = \phi'\Omega\phi + \Delta^2.$$

Where S is a matrix of item joint occurrences (the proportion of times pairs of items are sorted together), ϕ is the latent partition matrix which in the errorless case consists of 1's and 0's according to whether an item is in a particular latent category or not, Ω is the confusion matrix indicating the probability of an item being included in two different categories under independent sortings, and Δ^2, is the probability of items being included in two different categories under independent sortings.

The procedures for determining the number of latent categories and the matrices ϕ, Ω, and Δ^2, are described in Wiley (1967), and need not be reiterated. In the present study, for each set of definitions, there are four partitions available, ϕ_{11}, ϕ_8, ϕ_5, ϕ_T. The subscripts 11, 8, and 5 refer to grade level; the subscript T refers to the theoretical partition based on Evanechko's categories of definitions. The ϕ matrices for grade 5, 8, and 11 were cross tabulated with each other and with ϕ_T for each set.

The extent to which the four partitions of each of the five sets agreed with each other was measured using Evan's (1970) index of agreement A. This index ranges from 0, representing no agreement to 1 representing complete agreement. If X_{ab} is a matrix whose elements x_{jk} are the numbers of times examples of definitions in the j^{th} category of partition 'a' also occur in the k^{th} category of partition 'b', then a perfect cross tabulation exists between a and b if X_{ab} is a square matrix with only one entry in any row or column being greater than zero. For these partitions A = 1. For less perfect agreement the calculation of A depends on the amount of disagreement relative to the maximum amount of disagreement. The calculation of the maximum amount of disagreement described by Evans was modified by Patsula (1972) to avoid situations in which the maximum possible disagreement as defined by Evans is based on situations that can never occur.

Results of the Latent Partition Analysis

The indices of agreement between the latent partitions for each of the five sets are shown in Table 2. In Table 3, the cross tabulation matrices between each grade and the theoretical partition are presented along with the index of agreement and the number of subjects upon whom the empirical partitions are based. From these tables it can be seen that in all sets except C the degree of agreement between the latent partitions and the theoretical partition increased from grade 5 to grade 8 to grade 11. In Set C, the agreement between T and 11 is less than for either 8 or 5. If one postulates a developmental trend toward T, then the data are supportive of the hypothesis in all cases except C. Since the sampling distribution of the index of agreement is not known, it is impossible to investigate the differences on the basis of inferential statistics.

Considering Table 3, it must be admitted that the differences in contingency tables whose indices of agreement are of the order of .72 to .76 (Set B, grades 5 and 8) would be difficult to detect by eye. Differences of the order .79 to .91 (Set C, grades 11 and 8) are more obvious.

TABLE 2
INDEX OF AGREEMENTS BETWEEN DIFFERENT PARTITIONS OF THE FIVE SETS OF DEFINITIONS

Between	Set A	B	C	D	E
T & 11	0.94	0.84	0.79	0.94	0.80
T & 8	0.74	0.76	0.91	0.75	0.61
T & 5	0.62	0.72	0.88	0.55	0.46
11 & 8	0.79	0.71	0.90	0.79	0.69
8 & 5	0.72	0.74	0.84	0.76	0.62
11 & 5	0.59	0.72	0.74	0.57	0.56

TABLE 3
CROSS TABULATIONS BETWEEN THE LATENT PARTITIONS AT EACH GRADE LEVEL AND THE THEORETICAL PATTERN

Grade	Theoretical Set A	Set B	Set C	Set D	Set E
11	6 0 0 0 0 0 6 0 0 0 0 0 6 0 0 0 0 0 6 0 0 0 0 0 3 0 0 0 0 3 A = .94 n = 40	6 0 0 0 0 0 6 0 0 0 0 0 6 4 0 0 0 0 2 0 0 0 0 0 4 0 0 0 0 2 A = .84 n = 39	6 0 0 0 0 6 0 0 0 0 4 0 0 0 0 3 0 0 2 3 A = .79 n = 40	6 0 0 0 0 0 6 0 0 0 0 0 6 0 0 0 0 0 6 0 0 0 0 0 3 0 0 0 0 3 A = .94 n = 39	6 1 0 0 0 0 5 0 0 0 0 0 4 0 1 0 0 2 1 1 0 0 0 5 0 0 0 0 0 4 A = .80 n = 40
8	6 0 0 0 0 0 5 1 2 0 0 0 5 0 0 0 1 0 3 0 0 0 0 0 3 0 0 0 1 3 A = .74 n = 40	6 0 0 0 0 0 5 0 0 4 0 0 4 0 0 0 0 2 1 0 0 0 0 5 0 0 1 0 0 2 A = .76 n = 38	6 0 0 0 0 6 0 0 0 0 6 0 0 0 0 3 0 0 0 3 A = .91 n = 41	6 0 0 0 0 0 5 0 0 1 0 0 2 0 0 0 0 4 2 0 0 0 0 4 0 0 1 0 4 0 0 0 0 0 2 A = .74 n = 39	5 5 0 0 0 0 0 5 0 2 0 0 0 4 0 0 0 0 0 3 0 0 1 1 0 1 1 0 1 1 A = .61 n = 38
5	6 0 0 0 0 0 4 0 1 0 0 0 3 0 1 0 0 1 0 0 0 0 1 2 0 0 1 0 2 0 0 0 1 0 4 0 1 0 1 1 A = .62 n = 35	3 0 0 0 0 3 0 0 0 0 0 5 0 0 0 0 0 6 1 0 0 0 0 4 0 0 0 0 0 2 0 0 0 0 2 0 1 0 1 2 A = .72 n = 34	6 0 0 0 0 4 0 0 0 2 0 1 0 0 6 0 0 0 0 5 A = .88 n = 35	5 0 0 0 0 0 5 0 0 3 0 0 1 0 0 0 0 2 1 0 0 0 2 2 0 0 0 1 3 0 0 1 0 0 2 1 0 0 0 1 A = .55 n = 36	2 1 0 1 0 2 4 0 0 0 0 0 3 0 0 0 0 1 1 0 0 0 0 1 0 0 0 0 1 0 1 0 1 2 0 0 0 0 0 4 1 1 1 0 2 A = .46 n = 36

Although the differences in succesive indices are not always large, the consistency of the trend (excepting Set C) which exists in independent samples with independent stimuli gives strong support to the developmental hypothesis. Additional evidence (although not independent) can be garnered from the indices of agreement between grades within sets. If a trend exists, the agreement between grades 5 and 11 should be less than either the agreement between grades 5 and 8, or 8 and 11. In all sets except B this is the case. In Set B, $A_{8,11} = .71$ and $A_{5,11} = .72$.

An interesting result that occurred was that apart from Set B, $A_{5,8}$ is less than $A_{8,11}$. This would be consistent with the idea that greater change takes place between grades 5 and 8 than from grades 8 and 11.

Both of the anomalous sets (B and C) produced fairly high values for the index of agreement (all above .7) at all grade levels. This suggests that the subjects may have found the stimuli so easy to categorize that there was no discrimination along the developmental continuum. A close examination of the groupings made in Set C by the grade 11 students indicated that their lower agreement with T was caused by a tendency to overclassify. In the Action-of category, they discriminated between auditory actions and physical actions (example: baby-cry vs. rabbit-hop). It also appears that grade 11 sorters discriminated between Attributes of inanimate and animate objects (example: flame-hot vs. turtle-slow).

The overall consistency among subjects in grouping elements can be described by the average of $(1-\delta_1^2)$ where δ_1^2 is the diversity of item j, the probability of item j being included in two different manifest categories under independent sortings. Table 4 shows the average value of δ_1^2 for the fifteen situations (five sets by three grades). Also shown in the table are the number of

TABLE 4
AVERAGE OF $(1-\delta_1^2)$ FOR THE FIFTEEN LATENT PARTITIONS

Set	Grade	Average of $1 - \delta_j^2$	Number of Theoretical Categories	Number of Categories in Latent Partition	Average Number of Categories in Manifest Partition	Standard Deviation
A	5	.605	5	8	7.5	2.68
	8	.681	5	6	5.7	2.41
	11	.727	5	6	5.6	2.21
B	5	.552	5	8	7.1	3.11
	8	.635	5	6	5.8	2.57
	11	.731	5	6	5.4	2.05
C	5	.647	4	5	6.0	2.32
	8	.822	4	5	4.6	1.14
	11	.819	4	5	5.0	1.34
D	5	.500	5	8	8.4	4.47
	8	.652	5	7	6.6	2.55
	11	.665	5	6	6.2	2.10
E	5	.553	5	9	8.1	4.47
	8	.564	5	6	6.1	3.10
	11	.623	5	6	6.2	3.22

categories in the derived latent partition, and the average number of categories used by the sorters as they did the task and the standard deviation of the number of manifest categories used.

In all cases except Set C the consistency increases from grades 5 to 8 to 11. In Set C the average value for $(1-\delta_1^2)$ is .822 for grade 8, and .819 for grade 11. This difference is very small, and both values indicate that the consistency is so high that both groups can only be described as very consistent. In all cases the average number of manifest categories is greater in grade 5 than in either grades 8 or 11. Consistent with this (and partly as a result of it), the standard deviations are also larger for the grade 5 groups, indicating less consistency in the number of manifest categories used at grade 5. When comparing the grade 8 and 11 groups, the data on the number of manifest categories does not exhibit the same strong trend. The differences between the two grades are generally small, indicating that the major differences occurred between grades 5 and 8.

Identification of Strategies

In order to investigate grouping strategies, the students were asked to pick one of their groups, and explain how the definitions were similar. As stated earlier, heaps, complexes and superordinate groupings were seen by Vygotsky and Bruner as typical stages in the development of concept formation abilities. In Table 5 the responses are grouped according to these stages, and according to specific strategies within stages.

TABLE 5
CLASSIFICATION OF GROUPING STRATEGIES

Grade	Left Blank or Meaningless Heaps	Complexes				Superordinate Concepts		Total
		Thematic Groupings	Associative Group	Key Rings	Multiple Groupings	Subject Oriented	Definition Oriented	
5	17	5	50	2	4	37	61	176
8	7	0	29	1	0	29	130	196
11	9	1	9	0	0	38	141	198

Heaps

Only five subjects, all from grade 5 did not respond to the task of selecting and describing a group of definitions. In addition, 28 subjects' answers were judged to be "heaps" or impossible to categorize. (e.g. "I put these together because they all go together.")

Grouping in Complexes

An initial phase on the way to concept formation comprises many variations of grouping in complexes. The simplest complex is *thematic grouping* in which definitions or key words are put together by virtue of participating in a sentence or a little story. In thematic grouping, *n* different rules are used to

account for the *n* different stimuli placed together in the group. An example of grouping by theme taken from the grade 5 responses to Set E is:

crime—stealing or killing
surrender—surrender or be caught and killed
sharpen—sharpen the knife till it cuts well
bloody—a bloody knife

The explanation provided by the student was:

> One man is stealing and he is killing and the police said surrender because he was killing people with sharp knifes and it was bloody.

Three types of grouping by complexes that are more advanced than thematic grouping are associative groups, key ring groups and multiple groups. In an *associative group,* the child notes a factual relationship between two definitions and all other definitions are related to this relationship. An example of an associative group from grade 8, Set C was:

diamonds—expensive
farmer—tractor
pilot—airplane
play—piano

The explanation given was:

> Because they are all very expensive and they cost a lot to own and operate.

In *key ring* strategies, one definition is taken as the key and all other definitions in the group are included because they possess an attribute in common with the key definition. An example of a key ring strategy from grade 5, Set D was:

interfere—when you get in the way (KEY)
pebble—found lying on the ground
iceberg—from a glacier

The explanation given was:

> I picked set 7 the first card I got was interfere I also picked pebble because I thought a pebble would interfere, I picked iceberg because icebergs interfere with ships because ships sometimes crash into icebergs.

In *multiple groupings,* several rules were used to justify the inclusion of different definitions. Often, the child appeared to have clustered several groups for no apparent reason. Within each of the subgroups, there was some commonality. None of the explanations were particularly helpful in providing insight into the child's strategy. While multiple groupings have been ranked here alongside associative groups and key rings, they may represent a kind of transition between the use of heaps and the use of complexes. An example of multiple groupings that appeared for grade 5, Set D was:

egg—from a chicken
stove—found in a kitchen
knife—it has a blade
scissors—for cutting
envelope—for putting letters in
fishhook—it is attached to a line and rod
apple—grown on a tree

The explanation was:

> Scissors are very sharp, a knife can cut you, a stove is very hot. Envelopes are to put letters in, fishhooks are to put on lines. Apples grow, chickens lay eggs.

Superordinate Concepts

Considerably more sophisticated than complexes are superordinate concepts in which one universal rule for inclusion accounts for all of the definitions in the set. Both Vygotsky (1962) and Bruner and Oliver (1963), indicate that true concepts or superordinate concepts could be formed at various levels of sophistication. In the present study, two levels were noted. At the lower level, the subjects focussed on the perceptual or subject features of the cards. At the higher level, attention was direct to the functional or definition properties.

In *subject oriented concepts,* the word being defined or a key word from the body of the definition is taken and similarity is judged by focusing only on the quality or attributes of this single word. The sorter concentrates on the type of word being defined and placed the cards into sets of similar subject matter. An example of subject oriented grouping taken from grade 11, Set D was:

pebble—found lying on the ground
iceberg—from a glacier
dock—where whip ties up
fishhook—it is attached to a line and rod

The explanation was:

> In set 4 the rule used was that the things listed had to do with land and or water.

In *definition oriented* concepts the sorter concentrates on the whole definition and places the cards into sets so that all cards in a set have definitions that are similar. The universal rule of inclusion accounts for all definitions in the set by relating how the defining words give meaning to the respective subjects of the definitions in similar manner. An example of definition oriented grouping taken from grade 5, Set A was:

dog—collie
basketball—game
apple—fruit
beetle—insect
daffodil—flower
mushroom—plant
dessert—pie
fish—salmon
bird—robin
vegetable—carrot
animal—deer

The explanation was:

> In one of my sets (set 2) which consisted of 11 cards I used this rule: I looked at both words and if one of the words was a type of the other (eg. bird—budgie) I would pick it for this set.

The results shown in Table 5 indicate that the proportion of subjects using definition oriented concepts was greatest at grade 11 and lowest at grade 5. The proportion of subjects using complexes was greatest at grade 5 and lowest at

grade 11. The number of subjects using pre-concept heaps is fairly equal at all grade levels (12, 7, and 9 for grades 5, 8, and 11 respectively), but when the subjects who did not carry out this part of the task are included with this group, the number in grade five increases. Regardless of the validity of putting the non-respondents with the "heaps", the data for complexes and concepts show a strong order in favor of the hypothesis that older subjects use more sophisticated concepts in their grouping strategies.

Discussion

The results of the present study suggest that sometime between grades 8 and 11 (about 13 to 16 years of age), the students as a group become capable of distinguishing among the various types of word meaning. Although it was not possible to have subjects sort examples of all 24 relationships at one time, an attempt was made to have groups of subjects work with relationships that were likely to be confused with each other. Within this constraint, the older subjects produced latent categories that were remarkably similar to the "theoretical" categories. In addition, there was an increased sophistication of grouping strategies employed by the subjects over age levels. This finding is consistent with the Vygotsky and Bruner positions on concept formation generally, in that the development of concepts about word meaning appears to move from a fairly personalized level to a more formal structural level. The analysis of grouping strategies confirmed the finding that students in the eighth grade were beginning to be capable of making formal identification of some kinds of meaning.

There was some evidence to suggest that greater changes occurred between grades 5 and 8 than between grades 8 and 11. This is consistent with Piaget's (1950) view of cognitive development. Between grades 5 and 8 most of the children would be moving into the formal operations period which would allow them to attend to the structural and logical aspects of the definitions.

The evidence concerning the age at which the subject was able to classify the definitions may have been clouded by the high imagery values of many of the words used. Paivo (1969) states that there are two processes that underlie meaning, one deriving meaning from the interassociative relations among the words; the other deriving meaning from the imaginal representation of the words or units. Presumably if the image evoking qualities of the definitions used were high, it would be much harder for the subjects to attend to the structural qualities of the definition.

At a simple level, the evidence from the present study contributes to the utility of Evanechko's (1970) description of semantic space. At a more general level, the results may be useful for achievement test construction. Anderson (1972), in a discussion of the problems inherent in the construction of achievement tests to measure comprehension, points out that a method for deriving test items from instructional statements is needed, such that only those comprehending the statements can answer the items. Anderson suggests several ways in which comprehension questions can be formulated from transcripts of instruction. For example, questions may be formed by substituting synonyms or superordinate terms for words used in the instruction. His view is that to measure comprehension, items must be written which "occupy as much semantic space as possible."

The results of the present study suggest that for adolescent students, it may be possible to develop comprehension items by exploring the kinds of meaning listed in Table 1. For example, following a unit on statistics, the comprehension of the concept correlation might be explored by developing questions in which the student is asked to choose the statement which best illustrates the kind of meaning given. Definitions of the meaning categories would be supplied to the student. Five examples using only two alternatives are shown below. (The keyed response is marked with an asterisk.)

1. Similarity:	covariance—correlation*
	mean—correlation
2. Superordinate:	statistic—correlation*
	standard deviation—correlation
3. Coordinate:	correlation—mean*
	correlation—statistic
4. Repetition:	correlation—correlation of a variable
	correlation—correlation between two variables*
5. Use of:	correlation—for describing the relationship*
	correlation—for describing the variation

In this way, items occupying a substantial portion of the semantic space could be developed.

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The Alberta Journal of Educational Research *Vol. XXI, No. 3, September, 1975*

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Community Vocational Centres in Northwestern Alberta

A case study in social invention and development in the field of adult education

A Community Vocational Centre is a locally-managed adult education enterprise invented to meet primarily the needs of native Canadians in Alberta's isolated communities. Factors contributing to the invention included situational needs, new opportunities for occupations, new resources for educational upgrading, a climate of increasing aspirations and political awareness among native Canadians, and above all, strategically located and qualified personnel to undertake the inventing. Important organizational elements in CVCs include the local management committee, the educational technician, a regional vocational centre for training the technicians, a regional supervisory staff, flexible budgeting, and regional input into provincial policy making. After five years of steady growth in the number of CVCs and clientele served, educational attainment and aspiration among adults of the region's isolated communities has risen. The Educational Technician role has proven a significant channel of occupational mobility. However, as an innovation within the unpreempted social space of government administration and public education, CVCs still face critical challenges in local communities, in the region and in provincial decision-making arenas. (Dr. Card is Professor of Sociology of Education in the Department of Educational Foundations, University of Alberta.)

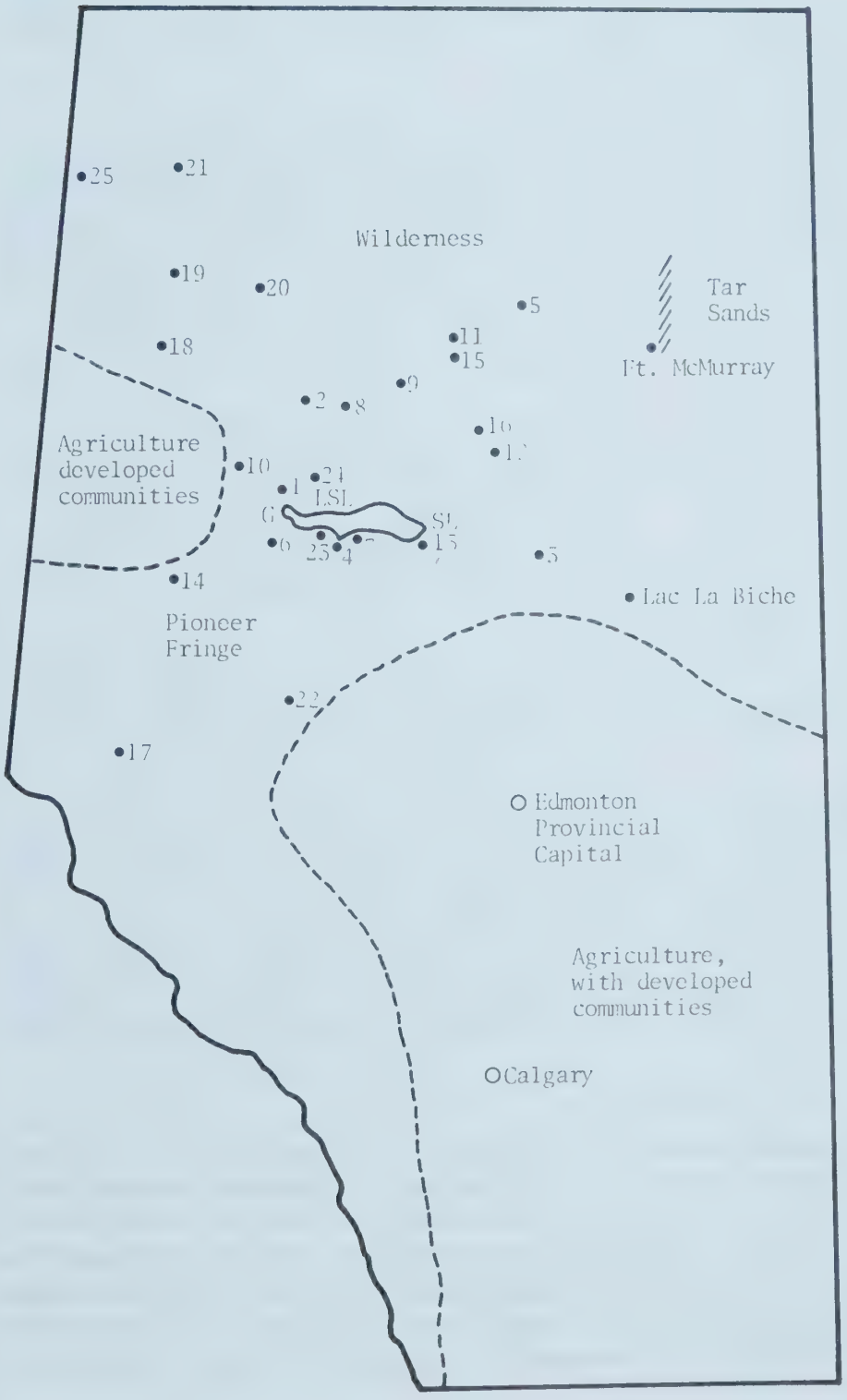
What are Community Vocational Centres?

A Community Vocational Centre (CVC) is the name typically given to a locally-managed adult education enterprise in an isolated or frontier Alberta community where a large proportion of the population are of native Canadian ancestry. In its organizational and operational aspects a CVC is a group of local adults meeting at times appropriate for them in some premise in their community known as "The Centre." Here they are aided in learning by one or more Education Technicians, who know the native language and local conditions. The Education Technicians are often recruited, and in most cases

selected, by the local Education Management Committee, which is responsible for the CVC. This committee, in addition to selecting the education technicians, is also concerned with recruiting and selecting students, operating the Centre premises, deciding on the programs offered, requesting enrichment and support services from outside the community, and negotiating and spending a budget. This is the CVC as a local enterprise. Their geographic distribution is shown in Figure 1.

FIGURE 1

SCHEMATIC MAP OF ALBERTA SHOWING COMMUNITY VOCATIONAL CENTRES IN NORTHWESTERN SERVICE AREA OF DEPARTMENT OF ADVANCED EDUCATION



Community Vocational Centres 1970-75

1. Big Prairie
2. Cadotte Lake
3. Calling Lake
4. Canyon Creek
5. Chipewyan Lake
6. East Prairie
7. Kinuso (S)
8. Little Buffalo
9. Loon Lake
10. McLennan (S)
11. Peerless Lake
12. Sandy Lake
13. Slave Lake (S)
14. Sturgeon Lake
15. Trout Lake
16. Wabasca
17. Grande Cache
18. Paddle Prairie
19. High Level (S)
20. Ft. Vermilion
21. Meander River
22. Whitecourt (Requested)
23. Faust
24. Gift Lake
25. Assumption (Projected)

LSL Lesser Slave Lake

SL. Town of Slave Lake

G. Grouard Alberta Vocational Centre

(S) Satellite CVC without an Educational Management Committee

However, such local enterprises require support from a regional level, especially when scattered over an area of 93,000 square miles, much of which is primal wilderness. Technical support is supplied from the Grouard Alberta Vocational Centre on the west end of Lesser Slave Lake. The Grouard AVC trains Educational Technicians and helps prepare their instructional materials for CVCs. Administrative support is provided for by a small staff of bush-experienced educator/community development personnel attached to the regional office of the Alberta Department of Advanced Education at the town of Slave Lake, on the east end of Lesser Slave Lake. This staff is responsible for coordinating, supervising, developing, promoting, evaluating CVCs, and negotiating budgetary requirements with the Department of Advanced Education. Between 1970 and 1975 a total of 23 CVCs were or had been in operation and two were about to be established.

Background, Origins and Objectives

The first CVCs were created in 1970. They were a relatively complex social invention which reflected the operation of three sets of factors, those reflecting specific needs of Northwestern Alberta, those reflecting new opportunities and resources available for the region, and most important, the availability of a pool of concerned and talented persons who were free to undertake inventing responsibilities. The interplay of these factors is depicted schematically in Figure 2. Eleven factors identifiable in the inventing process are as follows:

Situational-need Factors

1. Community change and trauma from successive Mainstream Society penetrations of the area, with a consequent lessening of the will and the ability of local inhabitants to gain a living from hunting, fishing and trapping.

2. Commercial exploitation and depletion of lake and forest resources, especially around Lesser Slave Lake, which jeopardized seasonal work opportunities for a rising population.

3. Virtual entrapment of some native Canadian segments of the population in lower social strata characterized by poverty, high alcoholism and crime rates, unemployment, and anomie. (Card, Hirabayashi, & French, et al., 1963; Hatt, 1967.)

4. Low educational attainment of the region's population generally, and more especially of the persons of native ancestry among whom there was an excessively high rate of youthful dropouts and a significantly high rate of adult illiteracy. (L. W. Downey Research Associates, 1974, pp. 57-60.)

5. The expanding role of government in the region, which, while extending controls, service and economic resources from Mainstream Society to the area, also tended to decrease the sense of independence and the decision-making power of local residents.

Opportunity-resource Factors

6. The assault on the problems of the region by a succession of researchers, community development workers and strategists bringing new knowledge, increased motivation and new mobilizations of resources to bear on these problems. Their efforts led federal/provincial governments to create the Lesser Slave Special Area for regional development in 1970, with a five year funding from the Department of Regional Economic Expansion. (See Appendix I for a list of influential documents.)

7. The availability of personnel, educational technology and educational programs from Alberta and Saskatchewan Newstart pilot projects for educating native Canadian adults.

8. The beginning of commercial exploitation of the Athabasca tar sands in Northeastern Alberta and the anticipated demand for trained workers of this and future tar sands developments.

9. The Grouard Vocational High School, opened in 1963 for the youth of the region, especially those of native ancestry (Chalmers, 1967, pp. 217-8), was closed in 1968. This closed, well equipped facility, complete with residences, was a source of embarrassment to education officials and a focus of native Canadian lobbying for their adult education.

10. The emergence of native power and influence as organizations were formed and as leaders emerged among both Indians and Metis of the region.

11. The presence and availability in the region of senior education officials concerned with community-level and regional vocational education, of personnel with expertise and experience acquired in Alberta Newstart, and of community developers from the Lesser Slave Lake Task Force of the Alberta Human Resources Development Authority, who were in constant dialogue with residents of the region, particularly residents of isolated communities.

The inventing of the CVCs occurred in the late 1960s when Alberta was developing a three-tiered province-wide system of vocational education:

1. A provincial-level set of technical institutes augmented by universities.
2. A regional-level set of vocational centres for adults and augmented by regional colleges.
3. A community-level set of vocational high schools, adult education programs and apprenticeships, which would meet local employment needs, facilitate entry of local persons to agencies offering advanced training, and contribute to the mobility of the labor force in relation to work opportunities in the province.

CVCs were conceived by both inventors and provincial policy-makers as community-level agencies uniquely appropriate for underdeveloped or isolated communities with native Canadian populations.

The objectives of CVCs were viewed operationally within the larger framework of regional development. According to HRDA's 1971-72 Program A they were to (1) provide introductory courses in occupationally oriented skills, (2) provide training close to home community, (3) provide foundation for additional training opportunities for employment or advancement because of training, (4) improve leadership activities and skills, (5) develop individual talents, (6) raise aspiration levels.

In addition to these objectives Villett (1969, pp. 3, 4) saw CVCs helping adults acquire enough basic skills to participate adequately in the English-speaking community, upgrading youthful academic dropouts, and helping local communities create an advantageous and supporting climate for children to continue education in local schools.

The CVCs, as a requirement for obtaining designated-area funds, were also expected to serve as vocational information centres for the community. Underlying all these objectives was an unwritten goal of maintaining and increasing the dignity, respect and self-worth of native Canadians by recogniz-

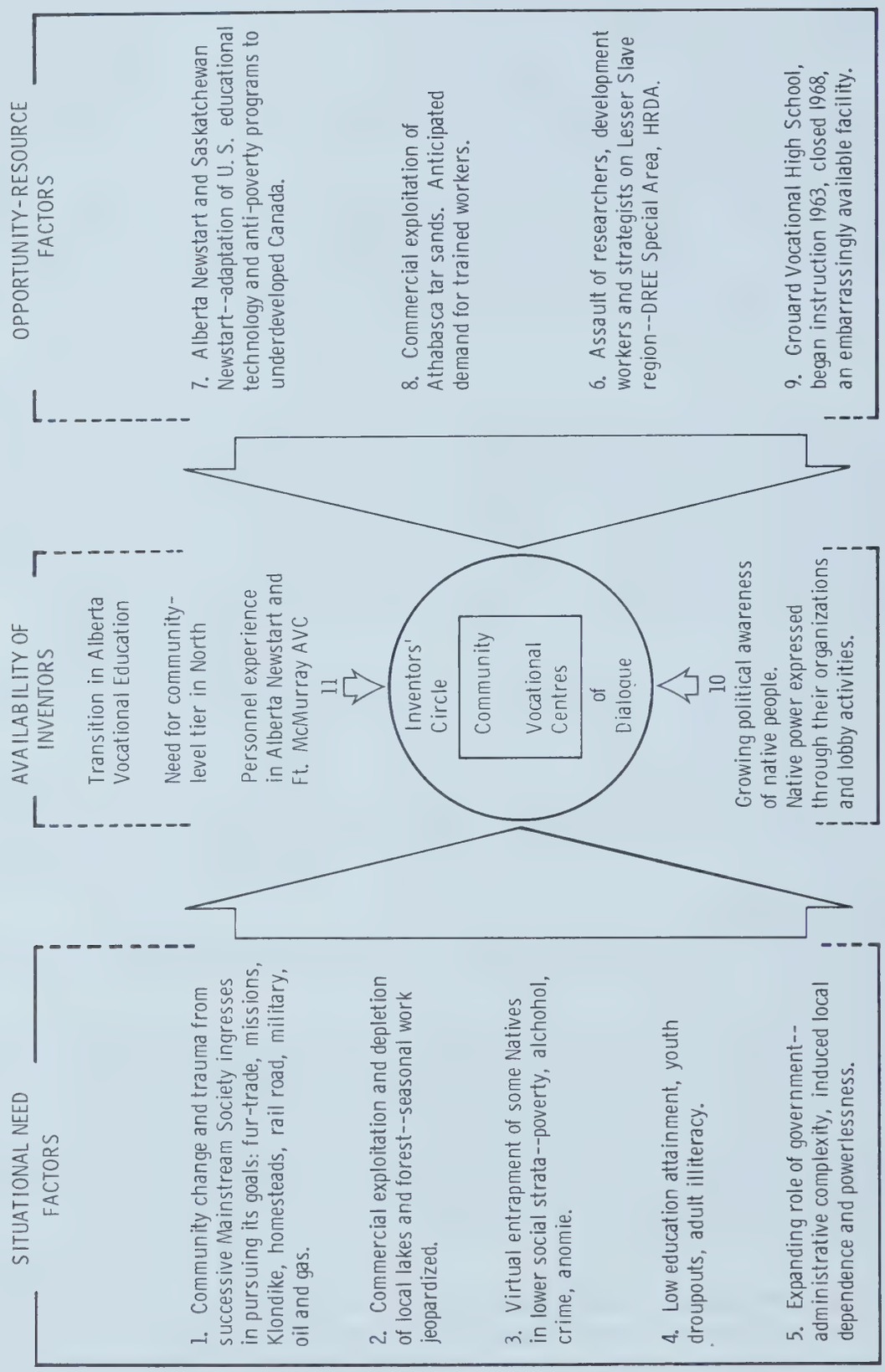

OPPORTUNITY-RESOURCE FACTORS
7. Alberta Newstart and Saskatchewan Newstart--adaptation of U. S. educational technology and anti-poverty programs to underdeveloped Canada.
8. Commercial exploitation of Athabasca tar sands. Anticipated demand for trained workers.
6. Assault of researchers, development workers and strategists on Lesser Slave region--DREE Special Area, HRDA.
9. Grouard Vocational High School, began instruction 1963, closed 1968, an embarrassingly available facility.
AVAILABILITY OF INVENTORS
Transition in Alberta Vocational Education
Need for community-level tier in North
Personnel experience in Alberta Newstart and Ft. McMurray AVC
11
Inventors' Circle
Community Vocational Centres of Dialogue
10
Growing political awareness of native people.
Native power expressed through their organizations and lobby activities.
SITUATIONAL NEED FACTORS
1. Community change and trauma from successive Mainstream Society ingresses in pursuing its goals: fur-trade, missions, Klondike, homesteads, rail road, military, oil and gas.
2. Commercial exploitation and depletion of local lakes and forest--seasonal work jeopardized.
3. Virtual entrapment of some Natives in lower social strata--poverty, alchohol, crime, anomie.
4. Low education attainment, youth droupouts, adult illiteracy.
5. Expanding role of government--administrative complexity, induced local dependence and powerlessness.

FIGURE 2
SCHEMATIC PRESENTATION OF FACTORS CONTRIBUTING TO THE INVENTING OF COMMUNITY VOCATIONAL CENTRES IN NORTHWESTERN ALBERTA 1967-1970
(Numbers refer to description of factors in the text)

ing the importance of their language and culture in CVC operations and by sharing and honouring the decision-making power of the locally-elected Educational Management Committee responsible for the CVC in its own community.

These early goals have remained constant in the operation of CVCs in isolated communities. As satellite CVCs have been established in larger, incorporated communities as a requested service operated by the Regional Office of Advanced Education, the goal of community involvement and management has been more difficult to achieve. (See Figure 1 for location and Figure 3 for organization of satellite CVCs and self-managed CVCs.) The organizational, governing structures and funding arrangements for achieving these goals are next considered.

Organization and Governing Structures

The full range of organization and governing structures for CVCs is shown in Figure 3. At the local level a self-managed CVC has three organizational components.

1. *The Educational Management Committee or EMC.* The EMC consists of three to five democratically selected persons, usually Cree-speaking in isolated communities, who meet as their affairs require. They assess and priorize community needs for adult education and leadership development. They also request and administer adult education programmes, the latter including student selection and termination, acquiring and maintaining facilities, hiring and supervising Educational Technicians for upgrading programs and staff for short courses, and evaluating outcomes. They are recognized by the Minister of Advanced Education as having a legitimate involvement in all aspects of their local adult education. They may claim $15 for each EMC evening meeting, $25 for each day-long meeting as individual honoraria, and travel expenses for required meetings away from the community. Satellite CVCs, operated directly by the coordinator of CVCs as a service in larger, incorporated communities, make use of local existing organizations for advice, and do not have an EMC as such.

2. *The Instructional Staff.* The key instructor is the Education Technician engaged to conduct academic upgrading courses. The Education Technician has been trained at Grouard for providing "Individualized Programmed Instruction" to illiterate adults (grade 0) and all other grades up to and including 9. In six instances, where the Education Technician also has teacher certification, instruction is given for grades 10-12. The training of an Education Technician is shown in Figure 4. The pay rates are from $668 to $855 per month, depending on experience and qualifications, rates which are higher than for teacher aides employed in Northland schools, but lower than for professional certified teachers. Under the supervision of the EMC, the Education Technician takes full charge of CVC up-grading instruction. Their informal roles often include some counselling, recreation leadership, and community development. They frequently recommend their advanced students for Education Technician training at Grouard, and themselves often move to other work or advanced training. They tend to be a flexible and upwardly mobile component of the CVC organization and in this sense serve as dynamic role models for the community.

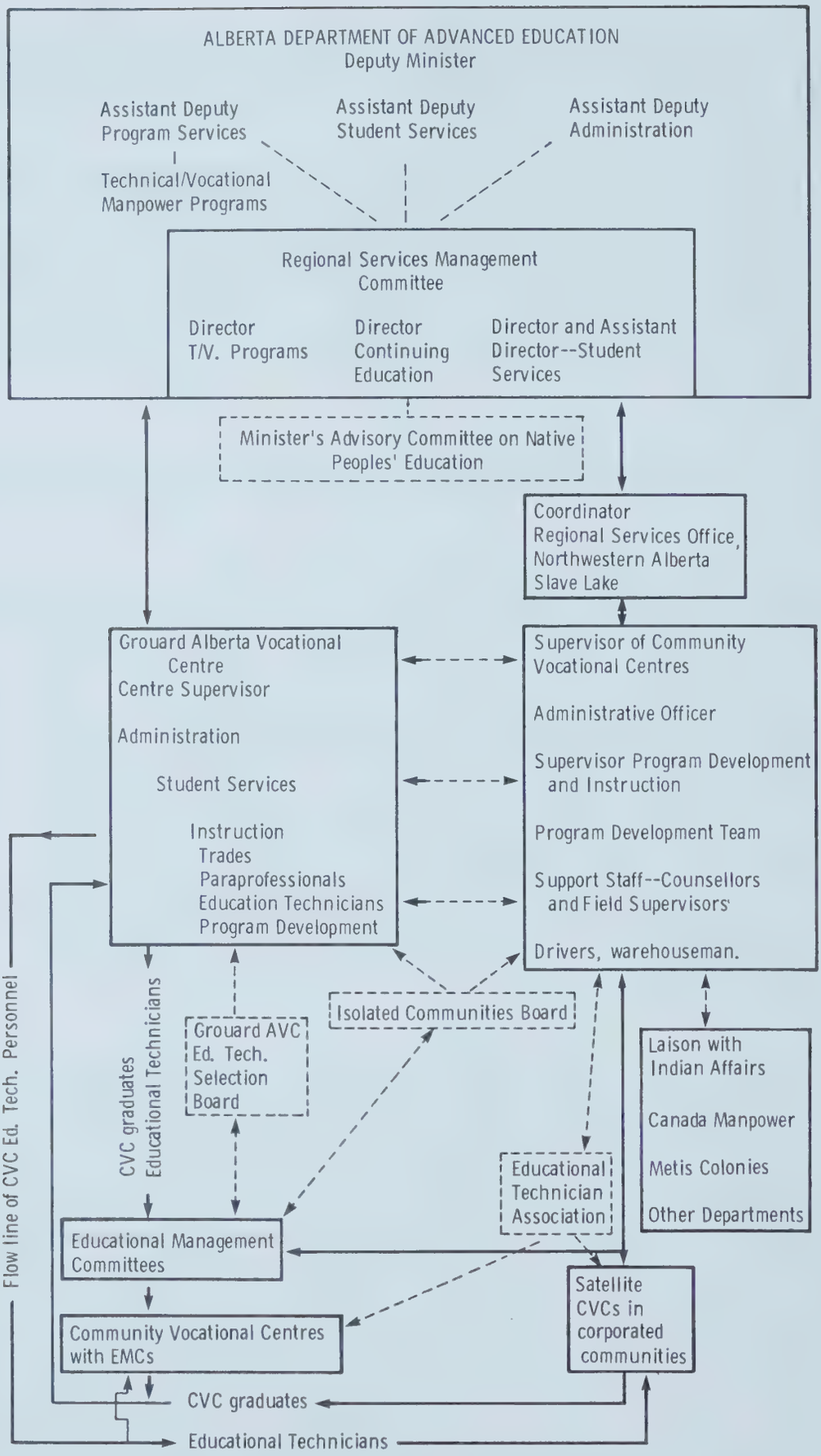


FIGURE 3
ORGANIZATION AND GOVERNANCE OF COMMUNITY VOCATIONAL CENTRES

Lines of control_____ of advice_ _ _ _ _

Other instructors are brought to the community by EMCs for short courses or workshops in such subjects as house wiring, cooking, or leadership development. Such instructors and necessary equipment are secured by the EMC on a contract basis.

FIGURE 4
THE TRAINING OF AN EDUCATIONAL TECHNICIAN AT GROUARD ALBERTA VOCATIONAL CENTRE, 1974-75
(Source: D'Aoust, 1974)

DURATION AND SEQUENCE OF EXPERIENCES:

Eight months: six months spent at Grouard AVC first, usually followed by paid teaching in the field, followed by two months back at Grouard during the next summer.

COURSE CONTENT

A. Teaching Materials Covered:

0-4 Mathematics	5-9 Mathematics
0-4 English	5-9 English
0-4 Reading	5-12 Reading
	5-9 Science

B. Practice Teaching -- 5 weeks.

C. Skills Training:

Audio-visual	25 hours
Typing	50 hours
Community and Leadership Development	30 hours
Public Speaking	30 hours
First Aid	Time as needed
Practicum in Speaking and Interpreting Native Languages	Time as needed
Life Skills Training	Time as needed

3. *CVC Clientele.* Adults and the older youths who have been out of school a year make up the clientele of CVCs. Those who are admitted as full-time trainees for up-grading are eligible for training allowances from Canada Manpower, Indian Affairs, or if they do not come in under these auspices, from Advanced Education. The 1974-75 allowance scale was $6 per day for a single person living at home to $18 per day for a person with four or more dependents. Since CVCs offer individualized instruction on a continuous intake and exit basis, trainees may enter or leave their program at any time for family or work

reasons, and when they are again free, carry on from where they left off. Students taking short courses do not qualify for training allowances.

As shown in figure 3, there are two major structures serving CVCs at the regional level. The Grouard AVC prepares Education Technicians as part of providing basic adult and vocational education for the region as a whole. The AVC is headed by a Centre Supervisor who reports directly to the Department of Advanced Education at Edmonton. The AVC instructors, counsellors and program developers preparing Education Technicians are in contact with CVCs through consultation with CVC supervisory staff at Slave Lake, through the Education Technician Selection Board made up of EMC representatives, and through association with Educational Management Committees from the entire region who hold meetings up to four times a year at the AVC.

The CVC supervisory staff, stationed at Slave Lake Regional Office of Advanced Education, is headed by a Supervisor of CVCs, who is directly responsible to the Regional Coordinator of Advanced Education. The Supervisor of CVCs is assisted by an Administrative Officer, a Program Development Coordinator and Academic Supervisor. Each of these three persons has a lengthy background of experience in northern Alberta communities. They are assisted by a support staff of Cree-speaking counsellors and field supervisors, most of whom have been Education Technicians, and a truck driver and warehouseman to look after supplies. In addition the Supervisor of CVCs is responsible for a Program Development Staff of three, stationed at Grouard where they are engaged, in collaboration with Grouard AVC program developers, in preparing instructional materials for CVCs.

As seen in Figure 3, there are two advisory bodies at the regional level, the Isolated Communities Board, which draws some members from local Educational Management Committees, and an association of Education Technicians which in 1974-75 was in the beginning stages of organization. At the provincial level the Minister of Advanced Education has an advisory committee on native education. At both regional and provincial levels, liaison is maintained with government departments, Canada Manpower, Indian Affairs, and Metis colony administration in CVC policy-making, program development, and the funding of trainees.

As the name implies, the important operations and involvements in the long run are at the community level, not as much the regional or provincial levels, except as these, through policy, staffing and budgetary arrangements, facilitate grass-roots community interaction and learning. The pattern for this was established by HRDA, and has been continued through the CVC Supervisory Staff at Slave Lake. Budgets are worked out in consultation with EMCs, on the basis of what they expect to do—enroll so many adults for upgrading, pay so much in training allowances, put on so many short courses, etc. These individual community budgets are aggregated by the Supervisory Staff and forwarded to the Department of Advanced Education for approval and consolidation into the budget submitted to the provincial legislature. This process has been likened to a private enterprise component in government, with each EMC in the role of a local entrepreneur in adult education. A diverging view is held by some middle-level government officials, who insist on budgeting not as community involvement but as the necessary preparation for the delivery of another government service. Given the power of an EMC to select or dismiss an Education Technician, to admit and terminate studentship, to contract for

short courses, and to control and manage local facilities, their budgeting is part of community involvement. They are in a sense the community's executive committee for adult education. In larger communities this degree of community control has not been evolved, though existing community organizations participate, somewhat intermittently, in a planning and advisory role.

As for actual budgets, the total estimated budget for CVCs in 1973-74 was $408,531 for tuition costs, $156,992 for training allowances.[2] This was for an estimated 300 trainees, for whom per capita costs would be $1,361 for tuition, $523 for training allowance. The 1974-75 estimates were $493,100 for tuition, $381,-077 for training allowance for an estimated 390 trainees, a per capita rate of $1,264 for tuition and $977 for allowance. The 1973 per diem cost of training, including allowances and tuition, is estimated at $9.00, while in 1974-75 it approximates $13. These costs compare favorably with costs in post-secondary or adult-education institutions of Northwestern Alberta and adjoining British Columbia, where, excluding CVCs, they range from $8.27 to $10.35 for instruction only, and from $14.67 to $31.71 for total operating costs, per student day. (L. W. Downey Research Associates, 1974, p. 89). However, these comparisons should not obscure the differences in budgets for individual communities, whose volume of potential trainees and their economic need can be taken into account by the EMCs. The principle involved here is that of locally-initiated unequal funding to provide equality of opportunity for persons whose ethnicity, language, age, location, socioeconomic status, and traditional occupations for many years have rendered other approaches to educational equality ineffective and frustrating for all concerned.

Current Status of CVCs and Observable Results

Since their inception in 1970-71, CVCs have increased steadily in numbers, in the number of students for which they have training places, and in the number of persons trained. In 1971-72, 175 students received approximately 8,000 days of training (Department of Advanced Education, 1972, p. 9) in eight CVCs. In 1974-75, it was estimated that 390 students would receive 67,250 days of training. During the mid-year there were indications that as many as 500 adults would be receiving training in 0-12 type basic and vocational courses and in short courses. While firm statistics were not available, supervisory staff estimated that educational and vocational aspirations of the student clientele were changing from basic literacy to completion of Grade IX as an expectation. In 1974-75 approximately 73 per cent of the students were at or near the 9 level, 40 students viewed 10 as their level; 14, grade 11; and 9, grade 12. Further, 15 per cent of the students, some aspiring to occupations requiring high school, were taking work at the 10-12 level. This is in a region where in 1961 one-third of all native adults had no education and only 0.8 per cent Grade 10 or more (L. W. Downey Research Associates, 1974, p. 58).

Perhaps the most remarkable transition is observable among Education Technicians. Between 1970 and October 1974 (D'Aoust, 1974) Grouard AVC had graduated 81 and had career information on 70. Of the 70, 29 were working at the AVC or in CVCs. Nine were working in related fields, but not with the Department of Advanced Education. Eight were working in unrelated fields, for example, laborers, while 8 had completed one or more years of university but had interrupted studies for a year to earn money, 7 were attending the University of Calgary, 4 the University of Alberta at Edmonton, 2 the University

of Saskatchewan, 1 was taking teacher training in the Northwest Territories, 1 had become a journeyman welder, while another was apprenticing in pipe trades at AVC Ft. McMurray. What the CVCs appear to have done, in addition to upgrading adults and raising their aspiration levels, is to have created a flexible job category, between that of an "aide" and a professional teacher, which has begun to meet mobility needs of an important segment of native young adults.

Two other results have become apparent, both not without risks to the future of CVCs, especially if they should expand rapidly. The first is that the growth in leadership capacity of EMC members is highly observable but also uneven, with the result that those manifesting leadership ability are frequently overworked locally or lured away from EMCs by requests for service at the regional level. Nevertheless, the pool of talented local leaders has increased through the work of the EMCs. The second is the growing demand of non-isolated communities and of different agencies for a CVC or a very similar organization, staffed with Education Technicians or their equivalent in some other field. Requests for "satellite" CVCs or for out-reach CVCs for persons in jails have increased and some have been set up, though when this happens the local control aspect tends to diminish.

A final accomplishment should not be overlooked. In six communities CVCs have built their own buildings, which have been sold back to the communities for the nominal charge of one dollar. These building projects have had an educative value for the entire community. It has been noted that vandalism has been absent where the community has done the building and taken over control of the CVC.

Difficulties, Problems and Crises of CVCs as Innovations

CVCs, beset with a bewildering array of problems locally, regionally, provincially and even nationally, have emerged from their formative years as adaptive, but still fragile outposts of democracy in adult education in a dynamic frontier situation. Their future appears to rely on two major factors, the strength of basic democratic process in the communities of the region, and a willingness of other levels of government and Mainstream Society to tolerate, facilitate and support this process. The array of difficulties and problems is formidable and crises of various degrees are virtually a daily or weekly occurrence. The following listing attempts to identify some of the major challenges of the CVCs.

Locally:

1. Excessive drinking, quarrelling, and outbursts of hostility and violence tend to paralyze and slow down community action in a number of the communities with CVCs, particularly along Lesser Slave Lake. The intense social problems of some communities tend to distort the goals and undermine the usefulness of any form of adult education and to make force appear as the most expedient solution for community problems.

2. Education is still not a priority value and needs development, though the situation has changed for the better as CVCs have begun to give new accessibility and meaning to education locally.

3. Overwhelming of the few willing, capable leaders with community responsibilities, to the point they have difficulty earning a living or caring for their families, especially as trappers or seasonal workers.

4. Abdication of EMC power and responsibilities by local EMC members to an Education Technician.

5. The lack of programmed instructional material for grades 10-12 puts an excessive load on the Education Technician. CVCs were originally designed and equipped with programs for 0-9. High school adaptations have been slow, partly because of divided opinion about their usefulness and legitimacy so far as CVCs were concerned.

6. A feeling among locals that much of the programmed instruction could be better related to their day-to-day concerns and experience. Life skills remain somewhat unintegrated with academic up-grading.

7. Some Northland School youth appear attracted to the idea of education with pay, so drop out and wait until they can enter a CVC, where they learn faster than in school and have an income. The actual numbers who do so are very small.

8. Persons without other means of support, face hardship from delays in processing training allowance applications through Edmonton computers. This has been overcome by arrangements for emergency, short-term help from the region's Social Development office. The problem of transferring medical coverage from persons transferring from Social Development assistance to educational training allowances has been overcome.

9. The intrusion of provincially complex government services into small, isolated communities overloads the community's committee-carrying capacity. The EMC may be competing for local time and talent with an Early Childhood Services Committee and Northland Division local school advisory councils, where they exist, with a committee for Preventive Social Services projects, another for the school's hot lunch program, with a local association required for the public nurse, with a recreation committee, or with a Local Further Education Council of Advanced Education, all of which are needed to have access to certain government funds or services. Top this mélange with a local Metis Association, an Indian Band Council, and one or two church-related voluntary associations, and the small local community even in the Northwestern Alberta becomes a complex and competitive environment for adult education.

10. CVCs have not resolved the problem of culture shock as local trainees migrate to larger centres for further training or work.

Regionally:

1. Sheer distance between communities is a major problem. This has been alleviated in part by new road construction. CVC supervisory staff resolve it their own way, by being private pilots.

2. Rival views about whether CVCs should be outreaches of an institution such as Grouard AVC or independent agencies supervised by persons with a community-development background and interest. The basic issue here is related to programs and their administration on the one hand, versus process, with the programs to express and aid process on the other. Grouard and Slave Lake appear to have worked out an accommodative division of labor here that is difficult to transmit to the uninitiated.

3. Rapid expansion of CVCs, especially in larger communities of the regions, where there has not been the time nor the energy put into developing

process aspects because of the immediacy of problems or the strong demand for academic up-grading programs by other funding agencies, especially on the part of Canada Manpower.

4. Modifications to the Education Technician role from those regional departments who would adapt it for social work, rehabilitation of prisoners, health education, or recreational leadership. Their single or combined efforts could render the new Technician a very powerful community figure, but without a local group to provide legitimation, supervision and appeal from his power. The EMC serves this purpose for the Education Technician who currently has a livable, useful, but non-threatening community role.

5. Expansion of CVCs outside the Northwest Alberta initial "Designated Area" puts strain on the capacity of Grouard AVC to train Education Technicians for a range of community environments and on the ability of the CVC Supervisory Staff to give sufficient attention to the local management component.

Provincially:

1. The organizational positions intervening between grass-roots EMCs and top provincial policy makers are filled with many highly-trained and dedicated persons recruited from developed Central and Southern Alberta concerned primarily with implementing policy in a regulated manner. The private enterprise, developmental and process aspects of CVCs do not conform to their traditional expectations. Recurrent instances of misunderstanding have to be worked out.

2. Major policy research in Alberta education has paid very little attention to CVCs. The Grouard AVC has been "phased out" of its contributions to CVCs in one long-range forecast (Commission on Educational planning, 1972, pp. 93-94), while another (L. W. Downey Research Associates, 1974, pp. 30-34) puts the Grouard centre on trial for two years. These studies imply a problematic future for CVCs, while at the same time providing no evidence that their unique contributions have been considered seriously.

3. The Education Technician role could readily lose its legitimacy and its flexibility from two sources: (1) regulations regarding teacher certification which have been carefully guarded by both the Alberta Department of Education and the Alberta Teachers' Association on the one hand, and (2) provincial civil service on the other, which could provide a permanent "slot" for Education Technicians fixing their classification, job descriptions, pay rates, retirement, and other matters, at a time when role flexibility has been and continues to be a major asset for the Education Technician.

4. Provincially-sponsored formula financing or its equivalent, a means used to equalize opportunity on a mass scale, could undermine the adaptability of CVCs with their locally initiated and managed budgets. As long as funding can be kept flexible and adequate, the CVCs stand a chance of surviving.

5. The Indian Association of Alberta has had, in conjunction at times with the Alberta Metis Association, designs for a native education system of education. Should such a system emerge, the CVCs as now organized and funded, could undergo modification or be discarded for some other educational arrangement, though CVC principles of operation might be retained for their essential usefulness.

6. The attraction and retraction of federal funding could change the CVCs. For example, a reclassification of Education Technicians to "Teacher Assistants" would allegedly open up grant possibilities from some federal programs. So far CVCs have withstood retraction of federal funds as the 1970 federal/provincial Special Area agreement ended in 1975.

7. A major threat at the provincial level is for a change of government to abolish or alter CVCs as a matter of take-over policy. The CVCs have passed through one change of government and survived, though the creative, facilitating arrangement known as the Lesser Slave Lake Task Force of HRDA did not. Perhaps the lesson here is that it is politically easier to alter regional organization than something so fundamental at the grass-roots level as a CVC. An alternative view might be that the CVCs persisted because they were perceived as a useful social invention by informed persons in all levels of government.

Underlying all the above problems is the possibility that CVCs, by successfully up-grading the educational levels and vocational skills of local community residents, may no longer be needed as they currently exist. When this condition arrives, new social inventions serving Northwestern Alberta communities will be required, but these can be developed from a much better basis of knowledge and experience because of CVCs.

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Presented at the Annual Meeting of the Canadian Sociology and Anthropology Association, Edmonton, May 30, 1975. This study was commissioned as part of a nation-wide survey of Canadian development projects potentially of interest to developing countries. The survey, funded through the Canadian International Development Research Centre and the Ministries of Regional Economic Expansion and of the Secretary of State, is directed by Professor Glen Eyford, Director of the M.A. Program in Community Development, University of Alberta.

[1] The information on which this report is based was obtained through observation, interviews and documentary study. Where data are taken directly from published sources, these have been cited. The writer takes responsibility for errors, omissions and interpretations presented here. At the same time he is mindful of his debt to those who so generously shared their experience and information related to CVCs. This report does not deal with the outreach CVCs operated in Northeastern Alberta as satellites of Lac La Biche Alberta Vocational Centre.

[2] Calculations by the writer, based on CVC appropriations in Appropriation Nos. 3063 and 3075, Department of Advanced Education, years ending March 31, 1974 and 1975.

APPENDIX

A Chronological List of Influential Reports and Proposals Relating to Northwestern Alberta and Native Canadians in Northern Alberta, 1958 to 1972.

Royal Commission on the Development of Northern Alberta
1958 Report, Edmonton: Queen's Printer.

Card, B. Y., G. K. Hirabayashi and C. L. French, in collaboration with S. Greenhill, B. A. Ruether and R. S. MacArthur
1963 The Metis in Alberta Society, with Special Reference to Social, Economic and Cultural Factors Associated with Persistently High Tuberculosis Incidence. Report on Project A(1960-63) University of Alberta Committee for Social Research, Prepared for The Alberta Tuberculosis Association. Edmonton: The University of Alberta.

Hatt, Fred K.
1967 Community Opportunity Assessment: Appendix A—Metis of the Lac La Biche Area. Edmonton: Human Resources Research and Development, Executive Council, Government of Alberta.

Banta, Gordon
1968 A survey of Problems in the Lesser Slave Lake Area. A Report to the Human Resources Development Authority, Government of Alberta. (Mimeographed.)

Bigam, Jerry F.
1968 Industry and Resources in Alberta's Census Division 15. Edmonton: Rural Development Research Branch, Economics Division, Alberta Department of Agriculture.

Rural Development Research Branch, Alberta Department of Agriculture
1968 An Analysis of Resources in Alberta's Lesser Slave Lake Area.

Alberta Human Resources Development Authority Research and Planning Division
1969 The B-15 Plan: An Outline for Rural Development in Alberta's Census Division 15. Edmonton: HRDA.

Government of Alberta
n.d. (1969) An address to the Honourable Jean Marchand, Minister of Regional Economic Expansion and Proposed Comprehensive Regional Development Plan for Lesser Slave Lake Area of Alberta, delivered by the Honourable Ray Speaker, Minister of Social Development, Chairman of the Human Resources Development Authority and the Honourable Ray Ratzlaff, Minister of Industry and Tourism, Chairman of the Physical Resource Development Committee of the Government of the Province of Alberta.

Department of Regional Economic Expansion
1970 Canada/Alberta Agreement in Special Area of Lesser Slave Lake 1970-72.

Aumack, Lewis
1972 Research Evaluations of Alberta Newstart Programs and Operations. Lac La Biche, Alberta. Alberta Newstart Inc.

The Alberta Journal of Educational Research *Vol. XXI, No. 3, September, 1975*

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Performance of Canadian Native, Black and White Children on Some Cognitive and Personality Tests

Cognitive abilities and personality characteristics were examined in Grade 4 children from (i) low and high socioeconomic strata from the white population in Edmonton, (ii) white and black populations in Montreal, and (iii) native children from a reserve school near Edmonton. Parents of these children were also given some personality tests and were interviewed to obtain an index of educational environment in the child's home, reflecting parents' attitude to the child's education. The results indicated that Canadian native and white groups showed differences in their performance on some of the cognitive tests. Personality differences, as measured by Eysenck's extraversion-neuroticism questionnaire and questionnaires for rigidity and locus of control, were negligible between the groups of children at the Grade 4 level. However, the adults in the three ethnic and two socioeconomic groups showed some significant personality differences. Performance of the children on reasoning and school achievement tests were predictable by parental attitude to child's education. This finding was discussed in terms of the role of personological and social variables which may affect the development of a child's cognitive competence. (Dr. Das is Director of the Centre for the Study of Mental Retardation, Faculty of Education, The University of Alberta; J. Manos is Assistant Professor of Education, Dalhousie University; Dr. Kanungo is Professor in the School of Management, McGill University.)

In the study of cognitive competence, there seems to be a shift in emphasis from "abilities" to an inquiry into the "processes" which determine an individual's level of performance. The shift has been influenced partly by the need of comparing the same "ability" in different cultures (Cole & Bruner, 1971) and of explaining such differences. It has been argued that the researcher

should consider the lower level performance in certain cultures as a difference rather than a defect as compared to the standards of performance by groups in Western culture. The cognitive style or strategy—an habitual mode of processing information adopted by a group—may account for the lower performance of the disadvantaged child (Das, 1973a). For example, Jensen (1971) observed that children from the middle to upper socioeconomic classes use reasoning and abstraction much more than those from the lower socioeconomic classes. The latter are quite proficient in associative learning, however. If one considers abstraction and associative learning as processes, one should then investigate the conditions which cause one group to use one process, such as abstraction, and not the other for integrating information. Evidence is now available to suggest that a particular mode of information integration, such as successive processing, may be used by certain non-white groups in tasks which usually elicit simultaneous processing in white children (Das, 1973b). Discussing a study on learning, race and school success, Rohwer (1971) not only noted differences in learning styles between ethnic groups, but also could demonstrate substantive improvement in the performance of minority children by teaching them an appropriate learning strategy for the task at hand.

Perhaps a general orientation for comparing intellectual performance among culturally different groups can be proposed at this point. Following Luria (1971), one may view cognitive activities as "a social phenomenon in origin, and as processes formed during the course of mastery of general human experiences" (p. 272). In other words, intellectual processes are not unchangeable and universal, nor should they have an a priori characteristic as is very often reflected in IQ. They are shaped by the experience through which a subgroup passes, and these experiences, or "historical developments" as Luria calls them, are reflected not only in what we think, but also in the structure or style of our thinking. Cognitive processes "are not independent and unchanging 'abilities' or 'functions' of human consciousness; they are processes occurring in concrete, practical activities, and are formed within the limits of this activity" (p. 266). Cole and Bruner (1971) essentially make the same observation by reminding one "that the most important thing about any 'underlying competence' is the nature of the situations in which it expresses itself" (p. 784).

Although one cannot deny the influence of genetic factors in determining cognitive competence, we have chosen to accept the views of Cole, Bruner and Luria as a basic framework to understand the effects of socioeconomic status and personality on a group's cognitive performance. In the present study, we have examined children from Grade 4 who belonged to white, black and native communities by giving them some cognitive and personality tests. The object is to find out how well the extra-intellectual factors, such as socioeconomic status, parental attitude towards the child's education and belief in an internal vs. external locus of control for one's behavior, can predict performance in some cognitive tests.

The effect of low socioeconomic status on school achievement is another concern of this study. It has been widely discussed before (Deutsch et al., 1967; Jensen, 1969). A review of the literature led Das (1973a) to conclude that the lower class child is more prone to academic failure than the middle class child. It may appear that the language of the former may stand as a major impediment in his scholastic progress. But the review suggested that it was not his

grammar which prevented him from doing well in school; rather, the total attitude of the lower class child and those of his parents or the community towards his education accounted for his poor performance. Thus, parental expectation regarding the child's education seems to be an important determinant of individual differences in school achievement.

In addition to expecting differences between the groups on cognitive tests in the present study, differences in some personality characteristics are anticipated. Both children and their parents would be examined for this purpose. It is hoped that because of the wide variations between the groups' socioeconomic class and/or ethnic membership personality differences, at least among the adults, are likely to occur. A person's class makes him conform to the image of the group (Sherif, 1947). However, this part of the study is of secondary importance, as only a few tests of personality which have known influence on learning and cognitive processes have been used in the present paper.

Method

Samples

The white children in Edmonton were taken from Grade 4 classes of public schools. The native children were from Grade 4 of a Cree Indian reservation school at Hobbema, about 40 miles from Edmonton. The white sample was divided between high (middle to upper) and low socioeconomic (SES) groups as determined by the occupation of the chief wage earner in the family on the Blishen scale (Blishen, Jones, Naegele, & Porter, 1965). the Means and standard deviations (SDs) of the two white groups on this scale were 59.50 ± 8.34 for the high and 40.20 ± 4.60 for the low SES group. It is inappropriate to apply the occupational scale to the native parents, but they could be easily categorized as low SES in terms of income for comparison purposes with the white groups. The number of children in each group was 30.

The white and black children in Montreal were taken from Grade 4 of the city's schools. Their SES was determined by parents' occupation, scored on the Blishen scale, as it was for the Edmonton samples. The means and SDs of scores on the Blishen scale were as follows: 55.85 ± 3.86 (high SES black), 42.84 ± 5.10 (low SES black), 56.44 ± 2.48 (high SES white) and 43.24 ± 5.16 (low SES white). There was a great deal of difficulty in locating appropriate groups of black children, as some school authorities were concerned about the sensitive issue of black/white comparisons. On several occasions the investigators had to bypass the school and contact the children through community organizations. Thus, the sample size for black parents and children who completed all tests could not be increased beyond 20 for each SES; for whites the size was 30 for each SES level.

Tests of cognitive abilities

All children were tested individually on the following tests:

1. Coloured Progressive Matrices. Raven devised this test, which has been widely used with children and is purported to measure reasoning. It is a culture-reduced test, measuring general intelligence.
2. Memory for Designs. Graham and Kendall (1960) devised a memory test for visually presented designs which is supposed to detect minimal brain

damage. It has been used to distinguish normals from retardates (Richie & Butler, 1964). However, in our study it is used mainly as a memory task for designs.

3. Cross-modal coding. The task was modified from one used by Birch and Belmont (1964). *S*s listened to patterns of sound, following which they were asked to recognize visually which of the three dot patterns resembled the auditory stimuli. Birch and his associates have found that this test discriminates between good and poor reading ability and between good and poor nutritional status of children. They do not rule out the possibility that the two variables are coexistent (Cravioto, Gaona, & Birch, 1967). The task was specially chosen here to demonstrate *S*'s ability to code auditory materials and recall them visually. It can be classified as a short-term memory task.
4. Visual short-term memory. The visual task consisted of separate presentations of 20 five-digit grids (devised by Drs. Howarth and Brown of the University of Alberta). It was a typical short-term memory task in which a grid was presented for *S*'s viewing for 5 seconds followed by a neutral filler task of color naming for 2 seconds to prevent rehearsal, and then required *S* to recall the digits on an empty grid. *S*s looked at 22 stimulus grids, one after another, and reproduced the digits on an empty grid after each presentation. The first two grids served as practice stimuli.
5. Figure copying. The test was developed by the Gesell Institute (Ilg & Ames, 1964). It has been extensively used and provides an estimate of intellectual ability (Jensen & Rohwer, 1970). It does not involve a memory component, as the child is required merely to copy the geometrical figure while it is in view.
6. Word reading speed. It is obtained from one of the Stroop (1935) charts. The names of four colors (red, green, yellow and blue) are written in block capitals and black ink, each 10 times in a random order. *S* is timed with the help of a stopwatch for reading the 40 words.

In addition to the above lists, only the Edmonton samples were given an auditory short-term memory test which yielded the serial and free recall scores. The test had 12 four-word lists prepared from a pool of semantically similar words (big, great, fat, high, large, huge, long, tall, wide) and 12 four-word lists of unrelated words (bar, book, cow, day, few, hot, key, pen, wall). All lists were presented by magnetic tape, the semantic and the unrelated lists following each other in a predetermined random order.

Further, the Edmonton sample had scores on reading and mathematics achievement from school records.

Parental attitude and personality tests

The adult personality tests, as well as the interviews, were conducted with the father of the child in an informal manner, mostly at the parents' home. For the children's tests, the same individual administration procedure as was used for cognitive tests was followed. Parents of native children often knew more Cree than English. While interviewing them, the experimenter (J. Manos) was accompanied by a Cree Indian who knew the families on the reserve and was good at both Cree and English. He interpreted the questions for the children after the experimenter presented them in English. The following is a brief description of the various tests used.

1. Index of educational environment (IEE) scale. Parental attitude towards the child's education was measured by using this scale first devised by Wolf and subsequently modified by Dyer (Wolf, 1966; Dyer, 1967). The part of the scale used in the present study elicited parents' responses regarding (i) interest in the child's academic achievement, (ii) knowledge of child's educational progress, (iii) parental aspirations for the education of the child, and (iv) parental preparation for higher education of the child. The parents' responses were obtained on the basis of an interview during which the interviewer asked a fixed set of general questions in each of the four areas. The interviews were taped so that scoring would not have to take place during the interview. Scoring was done on a nine-point scale for each of the four areas of parental attitude and then added to get a total score.
2. Extraversion and neuroticism. Eysenck's (1964) children's scale for measuring extraversion-introversion and neuroticism was administered to the children, while the adults were given the Maudsley Personality Inventory.
3. Rigidity or extreme response set. The scale evolved by Soueif (1958) is an ingenious device to illustrate extreme response set in adults. It is a friendship checklist requiring the subject to consider a series of adjectives, when attributed to a friend, and judge each one on a five-point "absolutely desirable" to "absolutely undesirable" scale. The total number of extreme responses scored as 1 and 5 are then counted for the subject, which is his rigidity score. The children's version of the scale was prepared by changing some of the adjectives so that these could be understood by children. Further research clarifying the nature of this test is to be found in Biggs and Das (1973).
4. Locus of control. The adult measure of locus of control was derived from Rotter (1966). The external-internal locus of control scale (ELC-ILC) measures a person's generalized expectancy regarding the causal nature of "behavior outcome sequences." The children's locus of control scale, devised by Crandall, Kratkovsky and Crandall (1965), was used to assess a child's belief in reinforcement responsibility exclusively in intellectual-academic achievement situations. The intellectual achievement responsibility, or IAR questionnaire as it is called, gives a total internal responsibility score as well as separate subscores for beliefs in internal responsibility for successes and failures. In the present study we have made use of the total internal scores only.

Results and Discussion

Personological characteristics of native parents and low and high SES white parents

For the purpose of comparison among the three parent groups, the means of biographical and personality variables are presented in Table 1. Inspection of Table 1 reveals that the native child's father has, on the average, five years of education and the mother, six years. In this respect they do not differ significantly from low SES white parents.

The native parents, again, have as high an aspiration and interest, etc., for their child's education as the low SES white parents, but both fall short of the aspirations of high SES whites, as might be expected.

It was interesting to note that the native parents were significantly more introverted compared to the two groups of whites; while the reason for this is not

clear, one may assume that some of the items on the questionnaire (e.g., Do other people think of you as being very lovely? Can you easily get some life into a rather dull party?) may not be very meaningful for them. However, their scores on neuroticism and on locus of control were essentially similar to those of white parents. In rigidity or extreme response set the low SES whites were significantly higher than both the native and the high SES whites, who did not

TABLE 1

MEANS AND SDs OF PERSONOLOGICAL AND COGNITIVE VARIABLES: HIGH AND LOW SES EDMONTON WHITES AND LOW SES CANADIAN NATIVE GROUP[1]

Variable	Group	Mean	SD	Mean Comparisons[2]	
Father's education	1	11.18	1.54	1 vs 2	$p < .01$
	2	8.20	2.03	1 vs 3	$p < .01$
	3	5.27	3.07		
	Total	8.22	3.31		
Mother's education	1	10.90	1.38	1 vs 2	$p < .01$
	2	8.57	1.61	1 vs 3	$p < .01$
	3	6.13	2.46		
	Total	8.54	2.68		
IEE interview	1	24.23	5.36	1 vs 2	$p < .01$
	2	15.63	7.50	1 vs 3	$p < .01$
	3	12.40	5.57		
	Total	17.42	7.90		
Adult extraversion	1	11.90	3.40	1 vs 3	$p < .01$
	2	10.93	3.17	2 vs 3	$p < .01$
	3	7.57	1.36		
	Total	10.13	3.32		
Adult rigidity	1	22.23	6.98	1 vs 2	$p < .01$
	2	31.23	11.88	2 vs 3	$p < .01$
	3	18.00	2.27		
	Total	23.82	9.66		
Child extraversion	1	17.87	2.91	1 vs 3	$p < .01$
	2	17.07	3.33	2 vs 3	$p < .05$
	3	15.03	2.50		
	Total	16.66	3.12		
Word reading	1	23.20	4.91	1 vs 3	$p < .01$
	2	24.80	4.37	2 vs 3	$p < .01$
	3	30.47	7.88		
	Total	26.16	6.60		
Progressive Matrices	1	29.37	5.14	1 vs 3	$p < .01$
	2	26.60	4.87	2 vs 3	$p < .05$
	3	23.37	4.70		
	Total	26.44	5.41		
Figure copying	1	16.83	1.97	2 vs 3	$p < .01$
	2	16.17	1.42		
	3	17.57	1.65		
	Total	16.86	1.76		
Cross-modal Coding	1	27.30	3.55	1 vs 3	$p < .01$
	2	26.73	3.52	2 vs 3	$p < .01$
	3	23.27	5.21		
	Total	25.77	4.49		

[1] Groups: 1 = high white (N=60) 2 = low white (N=60) 3 = native (N=60)

[2] ANOVA and Sheffé's multiple comparisons of means. Nonsignificant differences are not noted.

differ from each other. Their rigidity appears to be the manifestation of their experience of greater tension caused by constant social comparison of themselves with the majority group members. Low SES white parents, contrasted with high SES, may experience greater tension due to the operation of social comparison process in which they keep on striving to attain the levels of high SES white parents. The native parents, however, experience less tension because they do not consider white parents as their comparison group and insulate themselves against external cultural influences that might cause greater tension for them.

Personality and cognitive processes of the native, low and high SES white children

Table 1 presents the means of the three groups of children separately on various tests. Comparison of the means reveals that the only personality difference was in regard to introversion-extraversion. The native children, like their parents, were significantly more introverted than the two groups of white children. Beyond this, the three groups of children had similar personality scores in locus of control, neuroticism and rigidity. Thus, even though the native children were at a reserve school, they were more similar than different on the personality tests used here in comparison to the white children.

Cognitive tests in the battery were divided into three categories in terms of information integration: those that require a simultaneous processing (Progressive Matrices, Figure Copying, Memory for Designs), those requiring successive processing (short-term memory) and those measuring "speed" (word reading speed). The cross-modal coding task has an ambiguous status because it may involve each of the above three processes (Das, 1973b). Mean comparisons of the three groups on cognitive tests as presented in Table 1 reveal that native children were superior to the low SES whites in Figure Copying, obviously reflecting a better spatial-simultaneous process. However, they performed less well in the other simultaneous task, the Progressive Matrices, than white children, irrespective of SES. Their scores on cross-modal coding were also lower. But in successive processing their competence was equivalent to that of the white children. Speed of word reading is very much dependent on facility with English. Since the native children are less proficient in English than the whites, it was not unexpected that in the reading task the whites were faster.

Personological characteristics of black and white parents

The black and white parents belonged to both low and high SES. Thus there were four groups of parents. Is it more likely to find that the low and high SES groups differ than to find that white and black groups differ within the same SES?

An examination of Table 2, which presents the relevant means, indicates that both fathers and mothers of low SES black children, as well as those of low SES white children, had significantly fewer years of schooling than those of the high SES white. The low SES parents, irrespective of ethnicity, had a less favorable educational attitude for their children, particularly when compared with the higher SES white parents. In terms of personality tests, the ethnic or SES groups were indistinguishable except for rigidity. In this the two black groups, irrespective of SES, tended to be more rigid, especially when compared

TABLE 2
MEANS AND SDs OF PERSONOLOGICAL AND COGNITIVE VARIABLES: HIGH AND LOW SES WHITE AND BLACK MONTREAL GROUPS[1]

Variable	Group	Mean	SD	Mean Comparisons[2]	
Father's education	1	8.50	1.57	1 vs 4	$p < .01$
	2	9.71	1.84	3 vs 4	$p < .01$
	3	8.97	2.06		
	4	10.65	1.01		
	Total	9.53	1.83		
Mother's education	1	7.75	1.59	1 vs 4	$p < .01$
	2	9.01	1.75	3 vs 4	$p < .05$
	3	8.97	2.36		
	4	10.31	1.29		
	Total	9.14	1.99		
IEE interview	1	18.10	4.52	1 vs 4	$p < .05$
	2	19.35	5.28	3 vs 4	$p < .01$
	3	18.03	5.81		
	4	22.27	4.26		
	Total	19.58	5.25		
Adult rigidity	1	25.00	7.09	1 vs 4	$p < .01$
	2	24.25	12.71	2 vs 4	$p < .01$
	3	20.47	10.59		
	4	14.53	9.25		
	Total	20.35	10.73		
Child IAR	1	24.20	4.19	1 vs 4	$p < .05$
	2	24.40	4.15		
	3	25.20	3.75		
	4	27.33	3.56		
	Total	25.48	3.99		
Figure copying	1	9.70	3.16	1 vs 4	$p < .01$
	2	11.20	1.54	3 vs 4	$p < .02$
	3	10.73	2.50		
	4	12.90	2.86		
	Total	11.27	2.81		
Visual short-term memory	1	86.15	9.71	1 vs 4	$p < .05$
	2	89.90	10.31		
	3	90.10	10.02		
	4	94.00	6.96		
	Total	90.44	9.43		

[1] Groups: 1 = low black (N=20); 2 = high black (N=20); 3 = low white (N=30); 4 = high white (N=30)

[2] ANOVA and Scheffé's multiple comparisons of means. Nonsignificant differences are not noted.

with the high SES whites. Thus, Soueif's (1958) original finding regarding the higher rigidity scores for minority groups under tension appears to be supported in this case.

Personality and cognitive processes of black and white children

As is revealed in Table 2, with respect to personality patterns, the four groups of children were indistinguishable from each other except in one test; this was the locus of control (IAR). The high SES white children were significantly more internally controlled than the low SES black children. The remaining groups were not significantly different.

In cognitive tests reflecting simultaneous processing, there was no difference between the four groups except in Figure Copying. Low SES blacks and whites had significantly lower scores on this test than high SES whites.

The Progressive Matrices, particularly, would be expected to differentiate the groups on the basis of SES (Jensen, 1970). It did not do so either in the Edmonton or in the Montreal samples.

In short-term memory, a test of successive processing, the low SES black children had a lower score than the high SES whites; however, the difference was barely significant. Performance on the speed test was similar for the four groups.

On the whole, it appears that the native children can be more readily distinguished from the whites in terms of personality traits and in cognitive processes than either the black and white samples, or the high and low SES samples.

Prediction of Progressive Matrices performance of white and black children

The Progressive Matrices was the only cross-cultural intelligence test that we used across the subcultural groups. To what extent do noncognitive factors correlate with the performance on this test? Parental attitude, Blishen SES scores of parents *within each SES group* and the locus of control (IAR) of the child were employed as predictor variables for this purpose.

The percentage of variance accounted for by parental attitude, SES and locus control as a result of stepwise regression analysis is shown in Table 3. First, consider the Edmonton sample—only the high SES white children's scores are predictable. The major predictor is parents' attitude. Parents' SES standing adds to the predictability (r between parent's attitude and SES is .25, which is low enough, so that one does not mask the effect of the other). The contribution of the child's locus of control does not improve predictions substantially. For the high SES black sample in Montreal, parents' attitude is the best

TABLE 3
PREDICTION OF PROGRESSIVE MATRICES SCORES BY PARENTAL ATTITUDE (PA), SES AND CHILD'S LOCUS OF CONTROL (LC)

Group	Percentage of Variance					
Edmonton						
Low SES white	4.95	PA	18.21	PA + SES	21.77	PA + SES + LC
High SES white	21.53**	PA	27.21**	PA + SES	30.22*	PA + SES + LC
Native	2.59	PA	---		4.48	PA + LC
Montreal						
Low SES white	5.12	PA	6.31	PA + LC	6.34	PA + LC + SES
High SES white	23.13**	LC	25.66*	LC + SES	25.85*	LC + SES + PA
Low SES black	0.90	SES	1.06	SES + LC	1.07	SES + LC + PA
High SES black	39.36**	PA	42.61**	PA + LC	43.64*	PA + LC + SES

* $p < .05$
** $p < .01$

predictor of Progressive Matrices. The next best predictor is child's locus of control. SES adds very little to the total variance; however, this should be interpreted cautiously because of the moderate correlation of .59 between locus of control and SES. For the high SES white sample, child's locus of control is the best predictor, followed by SES; parents' attitude adds almost nothing to the variance.

Two points emerge from these results: (1) the Progressive Matrices scores of none of the low SES groups—whites and blacks—could be predicted; (2) in regard to the high SES groups, reasoning ability as measured by the Matrices is predictable from parental attitude and locus of control variables.

Prediction of school achievement

Reading and mathematics achievement test scores (school achievement) were available for the white children in Edmonton. The multiple regression analyses with respect to prediction of school achievement are presented in Tables 4 and 5. Multiple R was computed, the predictor variables being parents' attitude, SES scores and child's locus of control. It was found that reading achievement could not be predicted for the high SES children and mathematics achievement was only marginally predictable by parents' attitude. However, for low SES children both achievements were highly predictable. Parents' attitude was the most important predictor, accounting for almost 40 percent of the variance in mathematics achievement and 20 percent in reading achievement. The parents' standing on the SES scale added substantially to these predictions, but the child's locus of control scores did not (r between parent's attitude and SES was .55 based on 30 cases; r between locus of control and parental attitude or locus of control and SES were near zero). Thus, the proficiency of the low SES child in reading and mathematics is related to both parental attitude and SES. But his Progressive Matrices performance was not predictable. For high SES white children the opposite seemed to be true. These observations should be somewhat tempered by the fact that the standard deviation for reading achievement was larger for the low SES children than for the high SES (18.18 and 12.25 respectively). But they were comparable for mathematics achievement (16.86 and 15.88).

The conclusion appears to be that school achievement in the lower class children is substantially related to parental attitude and the position of their

TABLE 4
PREDICTION OF READING ACHIEVEMENT AND MATHEMATICS ACHIEVEMENT BY PARENTAL ATTITUDE (PA), SES AND CHILD'S LOCUS OF CONTROL (LC)

Group	Percentage of Variance					
	Reading			Mathematics		
High SES white	10.81	12.00	12.42	16.18*	17.55	18.28
	PA	+ LC	+ SES	PA	+ LC	+ SES
Low SES white	20.24**	35.76**	35.92**	39.64**	45.54**	45.82**
	PA	+ SES	+ LC	PA	+ SES	+ LC

* $p < .05$
** $p < .01$

parents on the SES scale, even within the narrow range of low SES scale values. A more specific study should inquire into the pattern of interaction between parents and their children of elementary school age in low SES homes, with particular attention to school work, in order to understand the basis for these relationships.

TABLE 5
PREDICTION OF READING ACHIEVEMENT AND MATHEMATICS ACHIEVEMENT SCORES BY COGNITIVE TESTS[1]

Group	Percentage of Variance							
High SES white	21.62**	27.54*			16.98*	22.85*		
	FC	+ STM			FC	+ CMC		
Low SES white	24.16**	29.85**	33.53**	35.69*	20.73**	24.64*	26.58*	
	SR	+ STM	+ FC	+ CMC	SR	+ FC	+ CMC	

[1]Figure Copying, STM Visual, Cross-Modal Coding, Serial Recall and Free Recall

* $p < .05$
** $p < .01$

In Table 5, the predictor variables are serial and free recall, short-term memory, Figure Copying and cross-modal coding. Of these, the memory tests require successive processing, Figure Copying uses simultaneous processing, and Cross-modal Coding uses both. The Cross-modal Coding task had been found to correlate highly with reading ability in previous research (Birch & Belmont, 1964; Birch & Gussow, 1970). One would expect that successive processing will be closer to reading, whereas simultaneous will better predict mathematics achievement. The results did not quite confirm the expectation. For the high SES children the free recall and short-term memory scores were good predictors of reading, as expected. The predictor variables for low SES reading achievement were serial recall and short-term memory, and to a lesser extent Figure Copying and Cross-modal Coding. In other words, a general competence in the cognitive tests predicted reading. Mathematics achievement was marginally predicted by Figure Copying and Cross-modal Coding for the high SES group. The prediction was somewhat better for the low SES group, jointly shared by serial recall, Figure Copying and Crossmodal Coding. It was interesting to note that serial recall was the major predictor of mathematics achievement in the low SES group. Perhaps this suggests that the low SES children are depending on a successive strategy in doing mathematics, whereas the high SES children adopt the expected simultaneous strategy. In predicting reading, Cross-modal Coding was not an important variable; this result should force one to rethink the association between the two variables.

It appears, then, that the social-personality variables predicted the mathematics achievements of low SES children much more efficiently than the cognitive tests, and both kinds of variables predicted reading achievement equally well.

In conclusion, we wish to point out the role of SES and parental attitude as predictors of reasoning and school achievement. Past evidence (Wolf, 1966) has

demonstrated that parental attitude towards the child's education correlated to an extent of 0.69 with child's IQ; in contrast, the correlation with SES was between 0.20 and 0.40. Our results generally showed parental attitude to be a better predictor than SES.

School achievement is another variable that has been associated with parental attitude and SES (Wolf, 1966; Dyer, 1967). Again, parental attitude has been found to correlate higher with school achievement than SES. Our data are consistent with those of Wolf and Dyer in this respect, although we did not use their full scale. The same general consensus is expressed in the report of the Plowden Committee (1967)—they found that the variation in the children's school achievement and IQ is specifically accounted for more by the variation in parental attitudes than by either the variation in the material circumstances of parents or by the variation in schools.

This research was supported by a Canada Council Grant (S69-0749) to J. P. Das. Dr. R. Kanungo was the other investigator and Dr. J. Manos, then a graduate student at the University of Alberta, was the senior research assistant for the project.

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The Alberta Journal of Educational Research *Vol. XXI, No. 3, September, 1975*

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Women Administrators and Women Teachers: A Comparative Study

This exploratory study was designed to compare three groups within the teaching profession—women school administrators, women teachers matched with administrators on years of teaching experience and teacher education, and women teachers randomly selected—on variables which may be relevant to career decisions. Literature on professionalism and professional role orientation, on socialization and sex role orientation, provided the conceptual framework for the study. (Dr. Nixon is a sessional instructor and Dr. Gue is Associate Professor in the Department of Educational Administration at The University of Alberta.)

The under-representation of women in positions of administrative responsibility in proportion to their numbers in the teaching force is a phenomenon which is not confined to Alberta (Asper, 1974, p. 5; McIntosh, 1974, p. 28). Certainly, in Alberta, the situation appears to be getting worse rather than better. The percentage of women teachers who are principals is declining while the percentage of men in administrative and supervisory positions is increasing (Alberta Teachers' Association, 1973, p. 2). In Alberta, in general, the more administrative responsibility attached to a position the less the probability that the position will be held by a woman (Nixon & Hrynyk, 1973, p. 1). This decrease in the number of women in school administrative positions is taking place at a time when there is concern that the 167 recommendations of the Royal Commission on the Status of Women (1970) intended to eliminate discrimination against women in all areas of Canadian life are being somewhat slowly implemented.

It is of some importance to know whether teachers perceive attitudinal barriers which deter them from applying for school administrative positions or whether, as Alberta school superintendents believe, lack of applications from women teachers is the result of "lack of interest" in the administrative task (Nixon & Hrynyk, 1973, p. 25).

Ensuing from present practice is a waste of potential leadership talent. At present educational leadership is drawn from approximately fifty percent of the teaching force. As Dale (1973) points out:

> At a time when good and perhaps great leadership is needed in education, the pool of leadership development must be expanded to include women or we must all learn to live with the mediocrity which is certain to result from a restricted source of leadership talent (p. 125).

There would appear to be a relationship between professionalism and upward mobility. High scores on a professional role orientation scale have been shown to be associated with persons occupying the higher positions in the educational hierarchy (Hrynyk, 1966, p. 210). The Professional Role Orientation scale devised by Hrynyk (1966) has shown that in Alberta there were differences in the professional orientations of different groups of teachers. Male teachers scored higher than did women teachers (p. 174) and "in general, higher scores were associated with positions which are usually ascribed higher 'status' in the school hierarchy" (p. 210).

An explanation has been sought in the socialization and resulting sex-role orientations of women for women teachers' lower professional role orientation scores and their seeming lack of interest in "status" positions. From very early childhood parents are concerned that their children learn appropriate sex role behavior (Goldberg & Lewis, 1972, p. 33). Most women acquire in childhood a traditional definition of the female role as that of wife and mother. Stereotyped sex roles are reinforced by formal schooling (Royal Commission on the Status of Women, 1970, pp. 180-183; McLure, 1973, pp. 111-113; Shack, 1973, p. 62). Epstein (1970) believes that childhood socialization "is nearly always crucial to later occupational decisions" (p. 19). Encouraged to take courses which guide them into traditionally female occupations, girls who hope to combine professional and homemaker roles may perceive teaching as a realistic choice.

It has been suggested that for some women achievement in the world of work is something which is better avoided since it is threatening to their sense of femininity (Horner, 1972, p. 173; Kimball, 1973, p. 132). For such women "success" in the man's world of work has a negative value. Women are warned, whether overtly or not is unimportant, not to be too successful in the man's world of work. However, if the career woman is often considered aggressive, overly ambitious, and by implication unfeminine, the homemaker is often held in low esteem. Society pays lip service to the role of woman as homemaker (Kimball, 1973, p. 132) but apparently very little more. Among women, it is increasingly recognized that the wife who is unable to define herself in terms of an occupational role in the labour force may find herself "ciphered out as an individual" (Bernard, 1971, p. 154). The response of many women to such ambivalent attitudes may well be a dissatisfaction with the role of homemaker together with a latent fear of appearing too successful in a career outside the home. The female teacher who believes her role of homemaker to be of greater importance than her professional role is unlikely to have any particular ambition to further her career by either seeking or wanting an administrative appointment.

Another explanation of women teachers' reluctance to apply for administrative positions (Hrynyk & Nixon, 1973) may be the belief that applications from women for administrative appointments are unlikely to meet with

success. Fishel and Potter (1973) would argue that "women teachers have seen how difficult it is for a woman to obtain an administrative appointment and have stopped trying to do so" (p. 390).

Research Procedures

This study was carried out in Edmonton, Alberta, Canada, during March, April and May, 1974. Permission was sought to approach women teachers and administrators in the Edmonton Public Schools for their cooperation in the study. The Edmonton Public School Board approved the study and provided information on all women teachers deployed in the system.

The Sample

Originally the sample consisted of one hundred and fifty-nine administrators and teachers in the Edmonton Public School System: (1) the total population of 53 women principals and assistant principals, (2) an equivalent number of women teachers matched with the administrators by a pairing system on factors of years of teacher education and teaching experience, and (3) a third numerically equivalent group drawn, using a table of random numbers, from a computer printout of all women teachers in the Edmonton Public School System. By holding constant two variables associated with administrative positions—teacher education and teaching experience—the inclusion of the matched group made possible a more careful examination of other variables on which administrators and teacher groups might differ.

The initial number of administrators and teachers were contacted by a letter dated March 1, 1974, which explained the purpose of the research. Out of a total of 159 administrators and teachers who were asked to participate in the study, 147 (92.4 percent) agreed to do so. However, actual participation rates were lower; 133 administrators and teachers completed and returned the questionnaire. Of these 133 participants, 47 were school administrators, 44 were in the group matched with administrators on years of teacher education and teaching experience, and 42 were in the randomly selected group.

Composition of the Interview Sample. Ten participants from each group (five who obtained a "traditional" score on the Sex Role Orientation scale and five who obtained a "liberationist" score on the Sex Role Orientation scale) were asked to take part in an interview situation. All agreed to do so.

Data Collection

All those who agreed to take part in the study were assigned a code number. During the third week in March a three-part questionnaire was mailed to all participants together with a stamped, self-addressed envelope. Part A sought responses on: (1) biographical data, (2) whether administrative positions had been or would be applied for, (3) personal and school board preferences for men as school administrators, and (4) time as a factor in accepting or rejecting an administrative appointment. Part B of the questionnaire consisted of a Professional Role Orientation scale (Hrynyk, 1966) and Schmidt's (1973) Sex Role Orientation scale made up Part C. In addition, free space was left on the questionnaire for comments.

The first section of the questionnaire consisted of closed, mutually-exclusive categories. Participants were asked to check their responses to the information sought. For the questions on: (1) personal and school board

preferences for male administrators, (2) time as a factor in accepting or rejecting an administrative appointment, and (3) interest in making an application for an administrative position, three response categories were provided. These consisted of Yes, No, and Undecided.

The Professional Role Orientation scale was made up of Likert-type items with response categories, Agree Strongly, Agree, Undecided, Disagree and Disagree Strongly. The response categories were weighted 1-5, the direction of the weighting being dependent upon the item.

The Sex Role Orientation scale was also made up of Likert-type items. The response categories, Strongly Agree, Somewhat Agree, Undecided, Somewhat Disagree, Strongly Disagree were weighted 1-5, the direction of the weighting being dependent on the item.

A check-list and a tape-recorder were both used in the interview situation. Questions were open-ended and the responses were categorized later from the tape recordings made at the interviews. Information was sought on: (1) socialization and career choice, (2) social change and sex roles, (3) women in administration, (4) stereotyping, and (5) application/non-application of participants for administrative positions.

Validity. Trust is crucial to the validity of the responses in this type of research where respondents are being asked to give information about their personal attitudes and beliefs. Essentially this is a problem of establishing trust on the part of the participants that the information which they volunteer will not be used to their detriment and that confidentiality of the responses will be safeguarded. Glazer (1972, p. 11) contends that this problem of acceptance is common to all field research.

In an attempt to gain the acceptance of which Glazer writes, the following steps were taken:

1. A letter outlining the purpose of the study and the method of data collection was sent to each member of the administrative, matched and random groups.
2. Each participant was a volunteer.
3. Each participant was assured of anonymity.
4. An attempt was made to ensure that the content of the items was personally non-threatening in the hope that this would lower the tendency for participants to give socially desirable responses.

The Professional Role Orientation (PRO) scale and the Sex Role Orientation (SRO) scale were accepted as valid instruments. The PRO scale developed by Hrynyk (1966) has been further validated by Scharf (1967) and Veitch (1969). The SRO scale has a pragmatic validity in that Schmidt claims that the scale does differentiate between traditionalists and liberationist attitudes (1973, p. 78).

Treatment of the Data

Questionnaire responses and categorized interview data were translated to computer cards. No attempt was made to compensate for missing responses in Part A of the questionnaire or in the interview data but missing responses on the PRO and SRO scales were assigned a value of 3 (undecided). A measure of professionalism was obtained by computing the sum of all items. Scores on the subscales provided the ratings for five dimensions of professionalism. Parti-

cipants with a composite score which fell in the upper third of all PRO scores were defined as "high" professionally oriented teachers and all those with scores in the lower third of all PRO scores were defined as "low" professionally oriented teachers. Similar procedures were followed for the SRO scale. Participants with scores which fell in the upper third of all scores were defined as having a "traditional" sex role orientation; those whose scores fell in the lower third of all scores were defined as having "liberationist" sex role orientations.

The focus of the study was a comparison between administrators, matched and random teacher groups and throughout the statistical analysis the three groups have been treated as three samples drawn from the populations. A one way analysis of variance was one statistical procedure employed in order to test for significant statistical differences between populations. The *F* test was used for intergroup comparisons. Where *F* proved to be significant beyond the .05 level, the nature of the implied difference was investigated further by the application of the Scheffé method of posteriori comparisons. For intragroup comparisons the T test of independent samples was used. Where the level of measurement of the dependent variable did not allow the use of parametric statistics, the statistic chi-square was used as a test for significance of difference.

Results

Questionnaire Data

Biographical variables. With respect to the biographical variables of teacher education, teaching experience and the related variable of age, there was a statistically significant difference between the random teacher group and the administrative and matched groups. Teachers in the random group had less years of teacher education, less years of teaching experience and were younger than participants in the other two sample groups.

A chi-square test of significance revealed significant difference between the sample groups in marital status. The distribution of the dichotomous variable married/not married is presented in Table 1. Although more than 70 percent of the teachers in the random group were married, this was true of less than 50 percent in the administrative group. This finding was supportive of the research reported by Epstein (1979, p. 96) that the incidence of unmarried women was greater among those "who rose to the top of their profession." For women who are not married, professional responsibilities do not have to com-

TABLE 1
CHI-SQUARE TEST OF SIGNIFICANCE BETWEEN ADMINISTRATORS, MATCHED AND RANDOM TEACHER GROUPS CLASSIFIED ACCORDING TO MARITAL STATUS

Marital Status	Administrators		Matched		Random	
	N	%	*N*	%	*N*	%
Married	23	48.9	26	59.1	31	73.8
Not Married	24	51.1	18	40.9	11	26.2
TOTAL	47	100.0	44	100.0	42	100.0

χ^2 = 5;756 (significant at the .05 level) d.f. = 2

pete with other role obligations of "wife" and "mother"—roles which are traditionally regarded as full-time occupations. Despite the difficulties presented by competing roles commented upon by some women teachers, no relationship between marital status and unwillingness to apply for administrative positions was established. Neither marriage nor dependents of any age precluded women teachers from applying or intending to apply for administrative positions.

Professional Role Orientation. Table 2 contains the results of the analysis of variance of the Professional Role Orientation scores between groups and the Scheffé multiple comparison of means. The *F* value of 4.70 with a probability of .01 indicated that the differences between the means was statistically significant. The Scheffé multiple comparison of means revealed a significant difference in group mean scores between the administrators and the random teacher group.

TABLE 2
ONE-WAY ANALYSIS OF VARIANCE OF PROFESSIONAL ROLE ORIENTATION SCORES AMONG ADMINISTRATORS, MATCHED AND RANDOM TEACHER GROUPS FOLLOWED BY THE SCHEFFE MULTIPLE COMPARISON OF MEANS

Source	s.s.	m.s.	d.f.	*F*	*p*
Between Groups	0.873	436.5	2	4.70	.01
Within Groups	0.120	92.83	130		

Scheffé Multiple Comparison of Means

Groups	Administrators	Matched	Random
Means	102.0	100.0	95.83
Administrators	-		
Matched	0.64	-	
Random	0.01*	0.126	-

* Significant beyond the .05 level.

A willingness to spend additional time was presumed to be related to the service attribute of professionalism. Responses to the question, "Would you turn down an administrative position if you thought it was going to be more time-consuming than classroom teaching?" are shown in Table 3. Discrepancy in the Ns between Table 3 and other tables is due to the arbitrary omission of "undecided" responses. A chi-square test revealed significant differences between the groups in their willingness to spend, if necessary, additional time on the administrative task. More than 90 percent in the administrative group are willing to spend additional time compared to approximately 70 percent in the other two sample groups.

Statistically significant differences existed on the PRO scale between administrators and the random teacher group. This provided additional support for Hrynyk's finding of a positive relationship between higher status positions

TABLE 3
CHI-SQUARE TEST OF SIGNIFICANCE BETWEEN GROUPS ON RESPONSES TO QUESTION 15 ON THE QUESTIONNAIRE[1]

	Administrators		Matched		Random	
	N	%	*N*	%	*N*	%
Yes	3	7.5	12	30.8	11	28.9
No	37	92.5	27	69.2	27	71.1
TOTAL	40	100.0	39	100.0	38	100.0

χ^2 = 7.659 (significant at the .05 level) d.f. = 2

[1] Question 15: Would you turn down an administrative position if you thought it was going to be more time-consuming than classroom teaching?

in the educational hierarchy and higher PRO scores (1966, p. 210). However, the administrators in this study also differed significantly from the random teacher group with respect to years of teacher education. The intervening variable between status positions and PRO scores may well be teacher education. Although the administrators' mean score on the PRO scale was higher than the mean score of the control group for teachers matched with administrators on years of teacher education and teaching experience, this difference in mean scores was not statistically significant. Simpson and Simpson (1969) have remarked that strong enthusiasm is not typical of women teachers' attitudes toward the profession but they do believe that "professional status and extensive training . . . increase women's vocational commitment" (p. 216). Thus professional education rather than the status positions per se may account for the statistically significant differences between the administrators and the random teacher group on the PRO scale.

Within the matched and random sample groups a relationship between willingness to apply for administrative positions and high PRO scores was not established but there was a tendency for the mean scores of those willing to apply for administrative appointments to be higher than the mean scores of those who were not willing to apply for administrative appointments.

Sex Role Orientation. In the development of the theory underlying the testing for statistical differences between groups on the Sex Role Orientation scale was the contention that women who held or who sought line positions would differ in their sex role orientation from those women who neither held them nor sought them. In addition, it was hypothesized that high PRO scores would be associated with less traditional definitions of the female role (i.e., low SRO scores).

No statistical differences were revealed between the sample groups but the random teacher SRO mean was the lowest of the three sample groups. This was in keeping with Schmidt's (1973, p. 106) finding that age was strongly related to sex role attitudes, the younger age categories being more liberationist in orientation.

Within the random teacher group, those who were willing to apply for administrative positions had a statistically significantly lower SRO score denoting a more liberationist sex role orientation, than those participants who were not willing to seek such positions (Table 4). Thus the premise that women

who held or who sought line positions would differ in their sex role orientation from women who had neither held them nor sought them was established within the random teacher sample.

TABLE 4
ONE-WAY ANALYSIS OF VARIANCE OF SEX ROLE ORIENTATION SCORES WITHIN THE MATCHED GROUP AND RANDOM TEACHER SAMPLES CLASSIFIED ON THE BASIS OF "APPLY" (GROUP 1) AND "NOT APPLY" (GROUP 2) FOR ADMINISTRATIVE POSITIONS

Sample Group	Group 1 N	Group 1 $\bar{x}$	Group 2 N	Group 2 $\bar{x}$	Group 1 S.D.	Group 2 S.D.	d.f.	T[1]	T'
Matched	14	146.86	30	146.93	19.39	14.79	42	-0.01	
Random	10	126.30	32	144.34	7.35	19.03	40		-4.41**

[1]Where the F test differences between variances proved to be significant (≤ .05) the Welch T' has been reported.

Beliefs Regarding Administration. Analysis of the data revealed no statistically significant differences between the groups as to beliefs concerning the preferences of school boards for male administrators. Women administrators appeared to be a little more convinced than other groups of school boards' open and unbiased policies toward them. Just under 20 percent of the administrators believed that men were preferred by school boards and this percentage dropped to 11 percent for the random teacher group. Asper, (1974, p. 88) in a study of women teachers and administrators in Manitoba, reported similar findings. In response to the item, "A school board will encourage male teachers rather than female teachers to apply for administrative positions," 68 percent of teachers either agreed or strongly agreed with the statement. This was also true of 55 percent of women administrators.

Within the matched teacher group a statistically significant relationship was established between SRO scores and preferences for a male authority figures (Table 5). In this group forty-three percent of those with traditionalist SRO scores preferred men in supervisory positions whereas all those with liberationist SRO scores expressed no preference.

TABLE 5
CHI-SQUARE TEST OF SIGNIFICANCE BETWEEN HIGH SRO SCORES AND LOW SRO SCORES AND PREFERENCE FOR MEN IN SUPERVISORY POSITIONS WITHIN THE MATCHED[1] TEACHER GROUP

	High SRO N	High SRO %	Low SRO N	Low SRO %
Prefer men in supervisory positions	7	43.8	0	0.0
No preference	9	56.3	10	100.0
TOTAL	16	100.0	10	100.0

χ^2 corrected for continuity = 3.97 (significant beyond the .05 level); d.f.= 1

[1]"Undecided" responses have been omitted in the calculation of this table.

Interview Data

There was no apparent difference in the socialization of any of the sample groups. For the majority of participants in all groups, teaching had not represented so much a "calling" as a practical career choice. In all three sample groups a number of participants said they would consider leaving teaching were they given the opportunity to do so.

Only in the administrative group would a majority of the participants recommend teaching as a career for their daughters. The reasons for administrators' recommendations varied from the pragmatic to the ideal of service as the following quotations illustrate: from "I think it is a marvelous thing for a young person to have that teaching certificate, especially a young lady," to "You can help children and people and society . . ." Generally, however, the reasons given were related to administrators' own personal sense of satisfaction with their career choice.

Regardless of the sample group to which they belonged, few participants believed that teaching provided equal opportunities for men and women to obtain administrative appointments. Beliefs in restricted professional opportunities for women were largely based on the number of women in the upper levels of the educational hierarchy. Administrators differed significantly from the random teacher group in that administrators perceived the position of supervisor as being open to them.

There were no widely held stereotypes of male and female school principals. This might be, in part at least, because few participants had worked in a school where the principal was female and therefore had no experiential base on which to generalize.

Administrators differed significantly from the matched teacher group in their perception of the administrative task. While administrators saw it as an interesting, professional challenge, the manner in which the teacher groups were apt to define the administrative task explained why a number of teachers—especially those in the matched teacher group—had no interest in it.

Despite the commonly made assertion that the homemaker role prevents women teachers from applying for administrative positions, only one participant in each of the teacher groups cited family responsibilities as the most important factor in making the decision not to apply for such a position.

Career decisions of administrators were very much influenced by authority figures in the educational hierarchy. Without some kind of professional sponsorship many expressed the doubt that they would ever have made the decision to apply for administrative positions. It would, therefore, be difficult to overestimate the importance of this variable in helping women teachers to make career decisions.

Conclusions

To generalize widely from an exploratory study such as this would be unwise. The conclusions that follow are both place bound and time bound in that the findings relate to the Edmonton Public School District No. 7 in 1974.

This study gave little support to the inference that women teachers perceive their additional roles of "wife" and "mother" as preventing them from applying for administrative positions. There were no significant differences between those who were willing to apply for administrative positions with respect to

these variables. However, some participants did indicate that their "willingness to apply" was future oriented—to a time when their family responsibilities would be less.

Administrators scored significantly higher on the Professional Role Orientation scale (PRO) than did teachers randomly selected but they did not obtain significantly higher scores than those participants in the matched teacher group where years of teacher education and teaching experience were controlled. This would seem to suggest that years of teacher education and teaching experience might well be important intervening variables between administrative positions and higher scores on the PRO scale.

In general, administrators appeared to obtain more satisfaction from their professional role than participants in the teacher groups. In comparison with teachers, administrators were: (1) less likely than participants in the teacher groups to consider an alternative career to teaching, and (2) more likely than participants in teacher groups to be positive in their recommendation of teaching as a career to others. While a career in school administration was considered as an interesting, professional challenge by administrators, this view was not widely shared among participants in the other sample groups. Teachers' definitions of the administrative task may contribute to their reluctance to apply for such positions.

The majority of participants in all sample groups believed opportunities for women teachers to be restricted. Formal equality within the profession with respect to salaries and fringe benefits has done little to alter the perceptions of the majority of women teachers that opportunities for advancement within the profession are not equal for both sexes. Women teachers hold few expectations for advancement in their careers and many have withdrawn from what they perceive as highly competitive achievement situations. Without some encouragement it is probable that the number of women teachers who apply for administrative positions will continue to be small in proportion to the number of women in the teaching force.

The findings of the study imply the need for imaginative leadership programs by school boards, professional associations and faculties of education, aimed at women teachers. Such programs would serve the purpose not only of identifying potential administrative talent but also of arousing interest in the administrative task as something more than just "paper work, discipline, timetabling, and things like that." In addition, sponsorship of women teachers who are interested in taking professional training in administration would add to a school board's credibility that the appointment of women to positions of administrative responsibility is more than mere tokenism. Entrenched attitudes are slow to change. It will take time, demonstrated fair promotion policies and patience on the part of school boards before women teachers become convinced that they too may attain influential positions in the educational hierarchy.

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The Alberta Journal of Educational Research *Vol. XXI, No. 3, September, 1975*

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Demonstrating the Relationship Between Values and Attitudes as a Means of Changing Attitudes

The purpose of the study was to test the effectiveness of two related strategies for changing a measured disposition of intolerance toward cultural diversity to one of significantly less intolerance. The strategies were generated from two sources: (1) dissonance theory of changing attitudes which suggests that if enough dissatisfaction with behaviour or beliefs exists, then change in the behaviour or beliefs will take place; and (2) Milton Rokeach's formulation that measured values are more central components of a person's make-up than measured attitudes, and values determine attitude. The first treatment attempted to determine whether a manipulated change in the relative position of three measured values related to tolerance (equality, freedom and broad-mindedness) would change the measured attitudes of students toward culturally diverse groups. The second treatment included the above sources of manipulated change and, in addition, demonstrated inconsistencies between ranks of the three relevant values and scores on the attitude scale. The treatment that was successful in changing attitudes was the second treatment. (Dr. Kehoe is Assistant Professor in the Social Studies Department, Faculty of Education, The University of British Columbia at Vancouver.)

The purpose of the study was to test the effectiveness of two related strategies for changing a disposition of intolerance toward cultural diversity to one of significantly less intolerance. The strategies were generated from two sources: Festinger's (1957, p. 13) dissonance theory and Milton Rokeach's (1968, p. 117) theoretical formulations about the relationship between values and attitudes. Dissonance theory suggests that if enough dissatisfaction with behavior or beliefs exists, then change in the behaviour or beliefs will take place. Milton Rokeach theorizes not only that measured values are more central and transcendental components of a person's make-up than measured attitudes, but also that values are determinants of attitudes. Rokeach suggests that we should be attempting to change values rather than attitudes because values provide us with a more economical tool. It is uneconomical to try to change a great many specific attitudes when all that may be needed is to enhance the importance of a small number of values related to the attitudes.

Research Questions, Sample, Design, and Treatments

To test the strategies the following research questions were investigated:

1. Did the subjects who were shown inconsistencies within their value hierarchies score significantly higher on the attitude scale on the post-test than those who did not have the inconsistency demonstrated to them?

2. Did the subjects who were shown inconsistencies within their value hierarchies, and in addition were shown inconsistencies between their values and attitudes score significantly higher on the attitude scale on the post-test than those who did not have the inconsistency demonstrated to them?

Sample

The sixty-four subjects for the study, which was completed in Surrey, British Columbia, were from two grade eleven history classes and one grade eleven law class. The subjects in the history classes were placed in the treatment groups at random. The law class was made up of students choosing it as an elective and it became the control group.

Treatments

The treatment and measurement dates are presented in Figure 1.

FIGURE 1
CHART OF TREATMENT AND MEASUREMENT DATES

	February 24	March 2	March 21
	Value Survey and Attitude Scale	Treatment	Value Survey and Attitude Scale
Control	O_1, O_2		O_3, O_4
Experimental 1	O_5, O_6	X_1	O_7, O_8
Experimental 2	O_9, O_{10}	X_1 & X_2	O_{11}, O_{12}

Both experimental groups and the control group were pre-tested with the Value Survey and the attitude scale, in that order, on the same day. Approximately one week later experimental group 1 was given the following treatment.

The Value Surveys of the subjects were distributed to them. The following statements were then made to the subjects.

> Look at your ranking of freedom. Now look at your ranking of equality. If your ranking of freedom is high and your ranking of equality is lower, this can be interpreted to mean that you are more interested in your own freedom than you are in freedom for other people.
>
> Look again at your ranking of freedom. Now look at your ranking of broadminded on the second page. If your ranking of freedom is high and your ranking of broadminded is lower, this can be interpreted to mean that you want freedom for yourself but are not broadminded enough to give that same privilege to other people. If you want to have freedom, other people are going to have to be broadminded and believe in equality

so that you might enjoy the freedom you value. It is to some extent inconsistent to want such privileges for yourself but not for other people.

The subjects in experimental group 1 were then given an 11-point scale on which they were asked to indicate the degree to which they were satisfied or dissatisfied with their rankings of each of the values.

The subjects in experimental group 2 were given the same treatment as that given to experimental group 1. In addition, after the discussion of the Value Survey, their attitude booklets were returned to them with their scores on the front. The following statements were then made to experimental group 2.

> Now look at the score on the front of your Information Survey. If you look at item twenty-one, I can show you how the score was calculated (item twenty-one was read to the class). If you agreed with item twenty-one, it suggests you are unwilling to support culturally diverse groups in this country. If you agreed strongly, you were given a 1; agreed moderately, a 2; agreed slightly, a 3; omitted, a 4; disagreed slightly, a 5; disagreed moderately, a 6; disagreed strongly, a 7. Look at item forty to see if you understand how the item was scored. Your score for each item was totalled to give you the score on the front of the booklet. A score under 190 is a low score. Place the numbers one to twelve down the left hand side of the front page of the Information Survey. Open your Value Survey so that you can see how *you* have ranked the values. I would now like to ask you a series of questions and I would like you to place your answers beside the numbers on the front page of your Information Survey.
>
> 1. If a person ranked broadminded high on the Value Survey, how would you expect him to score on the Information Survey, high, low, I don't know? Place your answer beside number 1.
> 2. If a person ranked broadminded low in the Value Survey, how would you expect him to score on the Information Survey, high, low, I don't know?
> 3. If a person ranked broadminded high and scored low on the Information Survey, would you conclude that his attitudes are *not* consistent with his values, yes, no, I don't know?
> 4. If a person ranked broadminded low and scored high on the Information survey, would you conclude that his attitudes are inconsistent with his values, yes, no, I don't know?
>
> Now look at your own ranking of broadminded and your own score on the Information Survey.

The same four questions were asked two more times with equality and freedom substituted for broadminded in each question. After each set of four questions, the subjects were asked to compare their rank of the value with their score on the attitude scale. On completion of the questions, the students were asked to complete two separate scales indicating the degree to which they were satisfied or dissatisfied with their ranking of each of the values and the degree to which they were satisfied or dissatisfied with their score on the attitude scale.

The two experimental groups and the control group were post-tested approximately three weeks after the treatments with the Value Survey and the attitude scale. In addition the control group was asked to answer two questions after the post-testing.

1. Given that an individual values freedom, what is your expectation about him valuing freedom for other people as well as himself—would you expect him to want freedom for other people as well as himself, yes, no, undecided?
2. Given that an individual values equality, what is your expectation about him valuing equality for other people as well as himself—would you expect him to want equality for other people as well as himself, yes, no, undecided?

The control subjects were asked to place their responses to the two questions on the front of the Value Survey. The intent of the questions was to determine whether they would perceive someone as inconsistent who valued freedom and equality for himself but not for other people.

Results

An analysis of variance on the change scores of each of the four variables is reported in Table 1. No significant treatment effects were found to exist for the three values. Significant treatment effects were found to exist for the attitude scores. The Bonferroni formula was used for controls of attitude change scores (Miller, 1966, pp. 66-70). Table 2 reports the results of the contrasts.

TABLE 1
ANALYSIS OF VARIANCE ON CHANGE SCORES

Variable	Source	df	M.S.	*F*	*p*
Attitude	Treatment	2	3620.3	11.8	.0001
	Error	61	306.8		
Equality	Treatment	2	24.79	2.21	.12
	Error	61	11.21		
Freedom	Treatment	2	.59	.06	.95
	Error	61	10.52		
Broadminded	Treatment	2	29.4	1.44	.25
	Error	61	20.46		

TABLE 2
CONTRASTS FOR ATTITUDE CHANGE SCORES

Experimental 1 - Control	2.4 ± 13.68	16.08	13.68	-11.28
Experimental 2 - Control	19.7 ± 13.68	33.38	13.68	6.02*
Experimental 1 - Experimental 2	17.3 ± 13.68	30.98	13.68	3.62*

* Significant $p < .05$

An effort was made to test for comprehension of the treatment with the second experimental group. A series of twelve questions were asked throughout the treatment and the answers were written on the front of the booklet. With twenty-two subjects and twelve questions there was the possibility of 240 incorrect answers. There were twenty-six incorrect answers, most of which were to questions four, eight, and twelve. On the basis of these results, a considerable degree of comprehension was assumed to exist.

The control group of the sample was also used to investigate the question of whether subjects would perceive as inconsistent someone who valued freedom and equality for himself but not for other people. Only one subject answered one of the questions with a no. Twenty-one subjects said a person would be inconsistent if he valued freedom and equality for himself but not for other people. An interpretation that should have been a source of dissonance was one where freedom was ranked high and equality low suggesting the subject valued freedom for himself but not for others.

Conclusions and Implications

It would seem that it is possible to change the measured attitudes of students toward culturally diverse groups. The treatment given experimental group 1 was ineffective in changing values or related attitudes. The treatment given experimental group 2 was not effective in significantly changing the mean ranks of the values. It was, however, successful in changing the attitudes of the students. It would seem that the attitude scores changed because the relationship between the relevant values and the items on the attitude scale was brought to the attention of the subjects.

It has been documented by Ziegler (1967, ch. IV) that values such as those of concern to this study are not taught or discussed directly as being valuable. Nor are the students taught that the values should be accepted by a large proportion of the population. Jaros and Canon (1969), in discussing Zeigler's findings, suggest that "... the overt value role of teachers is one of abdication. Teachers, aided by the texts from which they work, strike poses of exaggerated objectivity" (pp. 236-237). A similar situation is considered to exist in Canadian schools. Democratic concepts are discussed within a chronological history of the achievement of democracy in Canada and Great Britain. There appear to be very few attempts to discuss concepts such as freedom and equality and their various meanings in the context of modern Canadian society. Nor does there appear to be much discussion of situations where values come in conflict. Saul (1960, pp. 346-347) reports that he suspects one of the possible factors which may account for frequently observed "poor" citizenship behaviour is that the individual frequently fails to discriminate particular stimulus situations as requiring action. He goes on to state that school programs should provide more explicit and varied practice in the making of such discriminations. Remmer and Radler (1957) report similar findings:

> ... we find that American teenagers have well-crystallized democratic attitudes with respect to religious freedom, the right to trial by jury, and equality of opportunity. But the typical teenager shows an alarming disposition to reject some democratic beliefs, to throw away some of the basic freedoms . . . and to accept many authoritarian and totalitarian beliefs and values in their place. (pp. 186, 198)

Students are not given much opportunity to clarify their own value positions. For example, if a student accepts the democratic value of equality, it would appear to be useful either to help him to examine a variety of situations where he may or may not apply the value, or suggest to him that if he really accepts the value of equality as an important guiding principle in his life, then he should apply it to a wider number of situations than he does at present. Demonstrating inconsistencies between values held and attitudes or behaviour in specific and analogous situations would appear to be a useful strategy for achieving objectives like tolerant attitudes and behaviour.

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The Alberta Journal of Educational Research *Vol. XXI, No. 3, September, 1975*

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The Effect of Noise and Object on Acquisition of a Sight Vocabulary in Kindergarten Children

This study investigated the influence of classroom noise and two methods of presentation upon the rate at which kindergarten children learned four dissimilar words. A total of 120 subjects were randomly assigned to four groups of girls and four groups of boys, each containing 15 subjects. An Analysis of Variance by planned Orthogonal Comparisons revealed a significant difference ($p < .05$ level) favouring girls trained by the word-alone method under a no noise condition over girls trained by the word-object methods under a noise condition. No other significant differences were found. (Dr. Ollila is Co-ordinator of Graduate Studies, and Mr. Chamberlain is a graduate student, in the Faculty of Education, University of Victoria.)

Classroom noise and the use of prompting cues have both been of interest to educators. The purpose of this study was to investigate these two factors to discover their effects upon the rate of learning of a sight vocabulary by kindergarten children.

While researchers have long inquired into the effect of classroom noise, much concern had been generated by the recent interest in ecology. Konopa and Zimering (1972) identified noise as "our third pollution" and suggested that it has been demonstrated to be "a serious and present health hazard" (p. 116). Although educators have been exposed to claims for acoustical control in the classroom and school (McKay, 1964), researchers have reported contradictory findings.

Hartman (1946), in a review on the effects of noise upon children, stated: "Like all figure-ground phenomena, this one obeys the rules of Gestalt organization. On the whole, therefore, the more the work puts a demand on the higher mental processes, the more disturbing the noise is likely to be" (p. 159).

More recently, Kahneman (1973) suggested that the Yerkes-Dodson Law could be applied to the effect of noise on performance. Performance quality is

represented by an inverted U-shaped function of noise level (arousal). As the noise level first increases so does the quality of performance to an optimal point, and then begins to decrease with further increments of noise level.

Slater (1968) used seventh grade children to investigate three levels of noise in a classroom situation and in an experimental situation. Noise used was similar to that found in schools, but with addition of white noise (an heterogeneous mixture of sound waves extending over a wide range) in the experimental situation. Performance on the STEP Reading Test was not found to be significantly different between the groups.

Samture (1969) reported that third grade children, especially boys, performed significantly better under noise conditions than under typical classroom conditions. Three parallel forms of The Metropolitan Reading Achievement were administered as follows: Form A—regular classroom condition, Form B—noise from a record (orchestration held at a constant level), Form C—intermittent noise from a record played at varying intensities. Variance generated by the fixed order of presentation and the differences in test forms were not accounted for in this design. Samture concluded that a combination of factors (unspecified) and conditions produced better performance during the noise condition.

Nober (1973) administered parallel forms of the Wepman Auditory Discrimination Test to normal, speech defective, or reading retarded 5 to 8 year olds. One form was administered under a quiet situation, and the other form under a noisy situation. Both the A and B forms were randomly assigned across both noise and quiet conditions. In comparing the scores, she concluded that auditory perception was affected adversely by noise.

In these studies on the effect of noise, the measurement used was related to a task performance variable such as achievement test scores, rather than to the rate or efficiency with which learning occurred.

It has also been suggested that parents, teachers and pupils have little choice but to learn to live with noise. Children may learn to "tune out" extraneous noises by the time they enter school (Smith, 1962). However, "tuning out" has often been considered an equal problem by teachers (Wittich and Schuller, 1967).

Research in the area of prompting cues, such as the use of objects and pictures in the training of sight vocabulary, has also presented educators with contrary findings. Rohwer, Lynch, Levin and Suzaki (1967) found that an increase in learning efficiency occurred when the words were presented in sentence context, and that efficiency may be further augmented by the use of pictures. Rohwer suggested that the predicted superiority of pictures may decrease as verbal language ability increased over age. Wimer and Lamber (1959) found that undergraduates learned nonsense syllables faster when paired with objects than with words or in a mixed sequence.

Hartley (1970) reported a study on intra-list similarity and picture cues with kindergarten children learning sight words. It was found that a graphic stimulus was effective only when presented alone during study trials on minimal contrast lists. It was further suggested that if a graphic stimulus plus a context cue are to be used, they are most successful with a maximal contrast list. If a graphic stimulus alone is to be used, it is most successful with minimal contrast lists.

King and Muehl (1971) found that when pictures were presented with dissimilar words, learning was inhibited, while with similar words, learning was facilitated. Ollila and Olson (1972) using dissimilar words, found a significant difference between kindergarten boys, but not girls, favouring the word-alone method over the word-object method of presentation. In other studies with kindergarten children (Samuels, 1967; Duel, 1968), word-alone methods were found to be superior to the word-picture methods.

Samuels suggested that when pictures and words are presented together, the picture may distract or interfere with the acquisition of sight words. Similarly, Ollila and Olson (1972) reported that when prompting cues were presented, the children tended to shift or divide their attention between the words and the cue, while others attended to the cue only during the initial trials. Duel (1968) noted that those children who pointed to the cue the majority of the time learned less than those who pointed to the word or to the word plus cue.

Two summary questions appear to be pertinent: Do pictures and objects help the child make the correct association to the word, or do they cause him to not attend to the relevant features of the word, but to irrelevant or extraneous, peripheral characteristics? Does classroom noise increase, decrease or have no effect upon the rate with which sight words are learned by kindergarten children?

Samples and Procedures

120 children were selected from nine kindergartens in three Greater Victoria schools. Fifteen boys and girls were separately assigned to each of the noise conditions: noise (N), and no noise (nN), and to the two methods of presentation: word-alone (W), and word-object (W-O). Table 1 presents the seven Orthogonal Comparisons for the eight groups.

TABLE 1
PLANNED ORTHOGONAL COMPARISONS

Comparisons	Groups
1	All Boys x all Girls
2	(WnNB + WONB) x (WNB + WOnNB)
3	(WnNB) x WONB)
4	(WNB) x (WOnNB)
5	(WnNG + WONG) x (WNG + WOnNG)
6	(WnNG) x (WONG)
7	(WNG) x (WOnNG)

Four high-frequency words (horse, ball, pencil, telephone) were printed on 5" x 8" cards using electrocet, then laminated. The objects, ball, horse, and telephone, were children's toys. An authentic pencil was used as an object for the word, pencil.

Classroom noise was recorded during an activity period with 20 children ranging in age from 6 to 12 years. A Sony cassette recorder (model TC-110) was used for both the taping and play back in the noise condition at a mean intensity of 70 dbA at four feet from the subject.

Method

Each subject met individually with the experimenter in a small medical room or remedial classroom for approximately 20 minutes on one day. All subjects received pre-testing, pre-training, and training to criterion. Criterion was defined as two successive trials within which all four stimulus words were responded to correctly. The dependent variable was the mean number of trials to criterion.

During pre-testing the subjects were told, "I would like to play a game with you to see how fast you can learn some words. If you get some wrong, it doesn't matter, but you need to listen carefully. Before we start the game, let's see if you know any of the words. What is the name of this word?" All subjects were pre-tested on all four words using a non-correction procedure. Subjects who knew one or more of the words were not included in the study. Subjects in the two W-O groups were also presented with the objects and told, "Let's see if you know any of these objects before we start the game. What is the name of this object?"

During pre-training, subjects in the two W groups were presented with each word once, and told, "This is the word _____. What is the name of this word?" Subjects in the two W-O groups were presented with word and object and told, "This is the word _____, and this is a _____. What is the name of the word?"

During training to criterion, the four stimulus words were presented in random order on each trial. WnN subjects were presented with a word, then asked, "What is the name of this word?" If the correct response was emitted, the experimenter praised the subject and proceeded to the next word. If the correct response was not emitted, the experimenter presented the subject with the word and said, "This is the word _____. What is the name of this word?" W-OnN subjects were presented with a word, then asked, "What is the name of this word?" If the correct response was emitted, the experimenter praised the subject and proceeded to the next word. If the correct response was not emitted, the experimenter presented the subject with the word and the object and said, "This is the word _____. What is the name of the word?" WN subjects received the same treatment as the WnN subjects and W-ON subjects received the same treatment as W-OnN subjects but with the tape recording of classroom noise playing. All subjects were taken to criterion or to 20 trials. Subjects who did not achieve criterion were excluded from this phase of the study, but retained for further analysis.

Results

Table 2 presents the means and standard deviations for all eight group as well as the total.

TABLE 2
MEANS AND STANDARD DEVIATIONS

Groups	$\bar{X}$	S.D.
WnN boys	10.00	4.80
WnN girls	7.60-	5.88
W-OnN boys	8.13	5.25
W-OnN girls	7.93	6.10
WN boys	7.80	4.80
WN girls	9.53	6.18
W-ON boys	10.20	5.71
W-ON girls	11.73-	4.71
Total	9.12	5.58

In order to test hypothesis believed important and meaningful to the interpretation of results, an Analysis of Variance by Planned Orthogonal Comparisons was applied to the data. The eight groups permitted the seven comparisons presented in Table 3 (Hays, 1963).

TABLE 3
ANALYSIS OF VARIANCE: PLANNED COMPARISONS

Source	ss	df	ms	F
Between groups	230.63	7		
Comparisons				
1	.83	1	.83	.03
2	68.27	1	68.27	2.18
3	.30	1	.30	.01
4	.83	1	.83	.03
5	13.07	1	13.07	.42
6	128.13	1	128.13	4.09*
7	19.20	1	19.20	.62
Error (within groups)	3511.73	112	31.35	
Totals	3742.36	119		

* $p < .05$

Inspection of Table 3 reveals a significant difference favouring girls trained by the word-alone method of presentation under the no noise condition over girls trained by the word-object method of presentation under the noise conditions. Remaining comparisons were not significant.

Conclusion

The rate at which kindergarten children learned four high-frequency dissimilar words was not facilitated by the word-object method of presentation. A comparison of means revealed no significant differences favouring either presentation method, and no sex differences were observed as a function of presentation method alone.

However, the combination of word-object presentation and classroom noise was found to significantly depress the performance of girls, but not that of boys. In general, the performance of boys was not affected by the presence of noise, irrespective of presentation method.

This latter finding raises an interesting question regarding sex differences in children and their ability to tolerate classroom noise. Are boys more resistant than girls to the distractions of classroom noise because of some environmental or cultural influence? Generally speaking girls are expected to behave demurely and play quietly, while boys are expected to be more aggressive in their play and hence make more noise. Perhaps in the course of their development, boys acquire a greater tolerance for noisy surroundings than girls. Or is the difference attributable to some physiological characteristic of boys, lacking in girls, that facilitates a resistance to noisy distractions. The matter warrants further investigation.

In future studies of this kind, it may be useful to employ three or more levels of noise to clarify the relationship between learning rate and noise level. As Kahneman (1973) has suggested, there may be a quadratic relationship between performance quality and noise level (arousal).

Classroom teachers should recognize that an important determinate in the learning process may be the interrelation between the noise level in the room and the particular instructional materials employed.

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